MAY '56

MODERN TEXTILES MAGAZINE

Specializing in Rayon and Synthetic Fibers since 1925

FIBERS

FABRICS

FINISHES

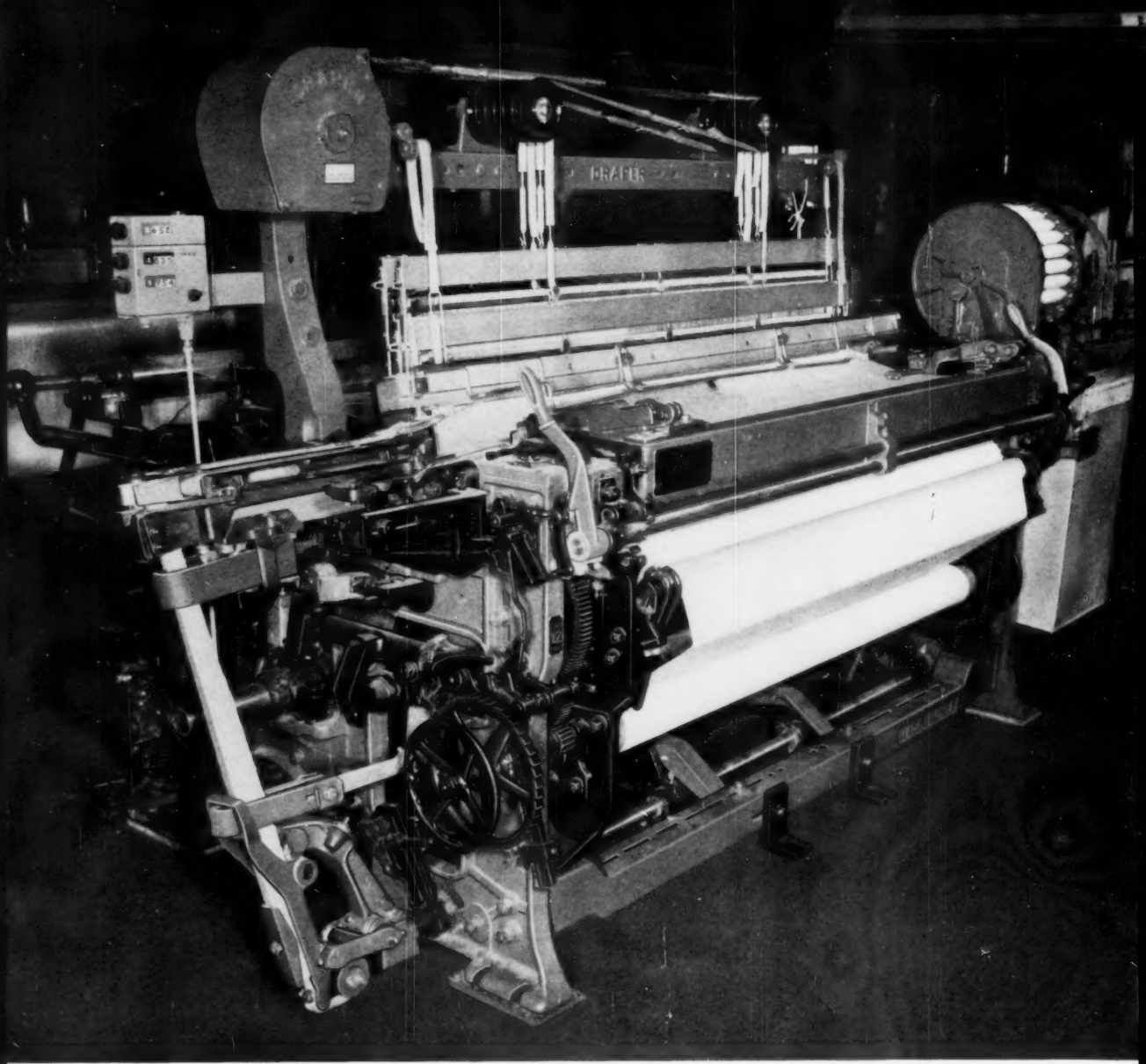
An old jute man turns to the new fibers. JAMES MALCOLM proves he's still young enough to learn.

Story on page 31

THIS MONTH'S SPECIAL FEATURES:

New winder cuts costs
Rayon wash and wear finishes
New uses for polyethylene yarns
Better textures in nylon carpets
How to handle Agilon stretch yarns

AND 16 MORE TIMELY ARTICLES AND EXCLUSIVE REPORTS



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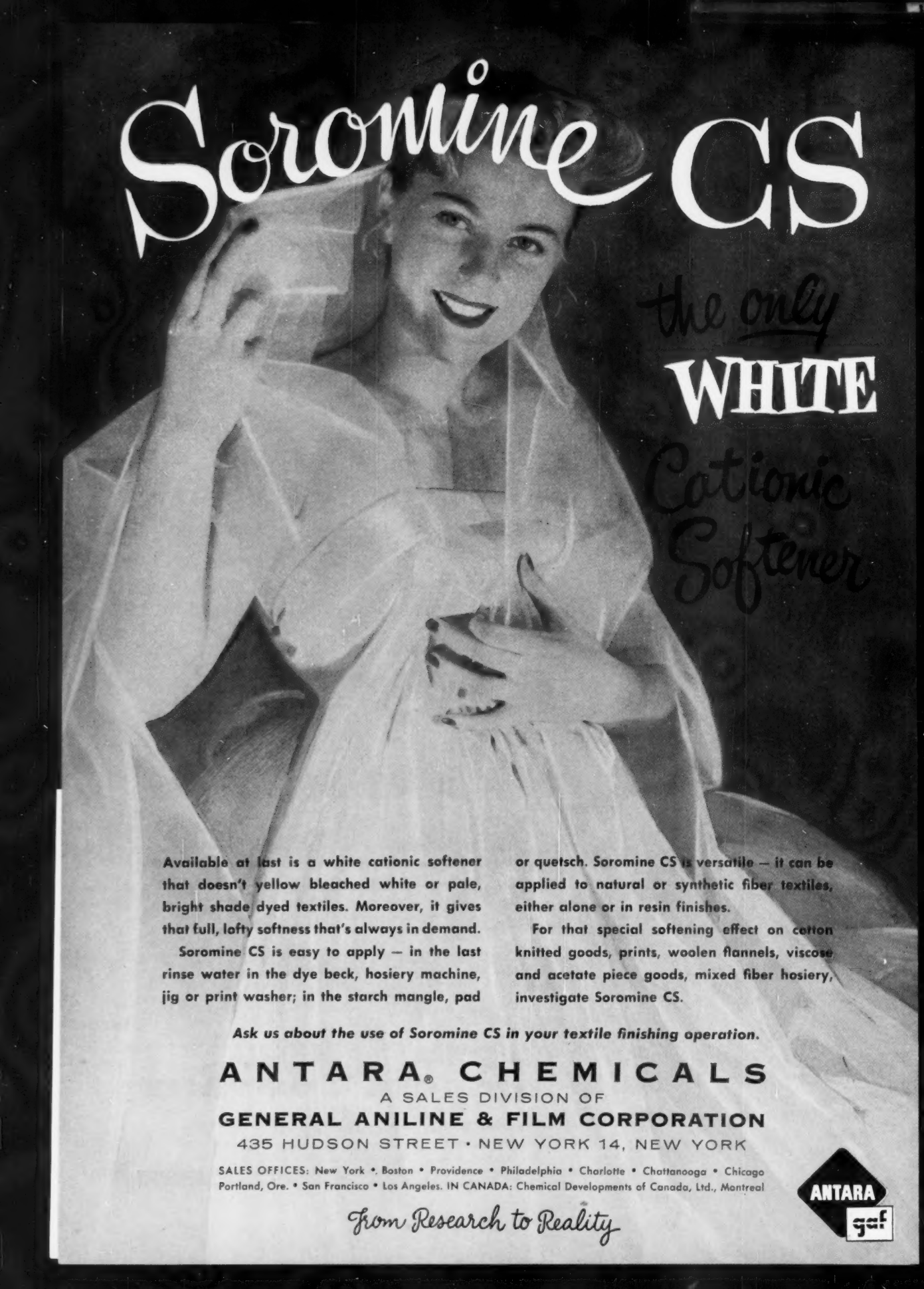

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MODERN TEXTILES MAGAZINE*

May, 1956 Vol. 37, No. 5

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The Principal Trade Groups

Rayon and Acetate Fibers Producers Group ..... Empire State Bldg., New York
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Sherrill Heads Eastman Sales

Eastman Chemical Products, Inc. made known several organizational changes in the departments handling sales and service of its textile fibers. These appointments follow the announcement that Eastman will now produce Verel, a modified acrylic fiber, in addition to the cellulose acetate fibers the company produces.

John R. Sherrill

Frank Ruddock

The appointments are: John R. Sherrill, sales manager, Textile Division; W. T. Jackson, assistant sales manager, acetate yarn and staple sales and sales service; C. F. Earnhardt, Jr., assistant sales manager, Verel Fiber, filter products and sales development; Frank Ruddock, manager, Verel merchandising; H. W. Smith, service representative, Verel sales service. All appointees have their headquarters in Kingsport, Tenn., except Mr. Ruddock, whose headquarters are in New York City.

Soluble Fiber Uses Are Increasing

A host of worthwhile uses for soluble fibers—from detecting airborn germs to making skinless frankfurters—was described by Dr. J. David Reid of the U. S. Department of Agriculture at the American Chemical Society's 129th national meeting on April 11th.

Dr. Reid surveyed the latest methods for chemically changing cotton yarns to make them soluble and discussed new uses for such "disappearing threads". Present or potential uses include:

The manufacture of crepe nylon by twisting soluble cotton yarn together with nylon, making the twists permanent by heat treatment, then dissolving the cotton to leave a coiled nylon "spring".

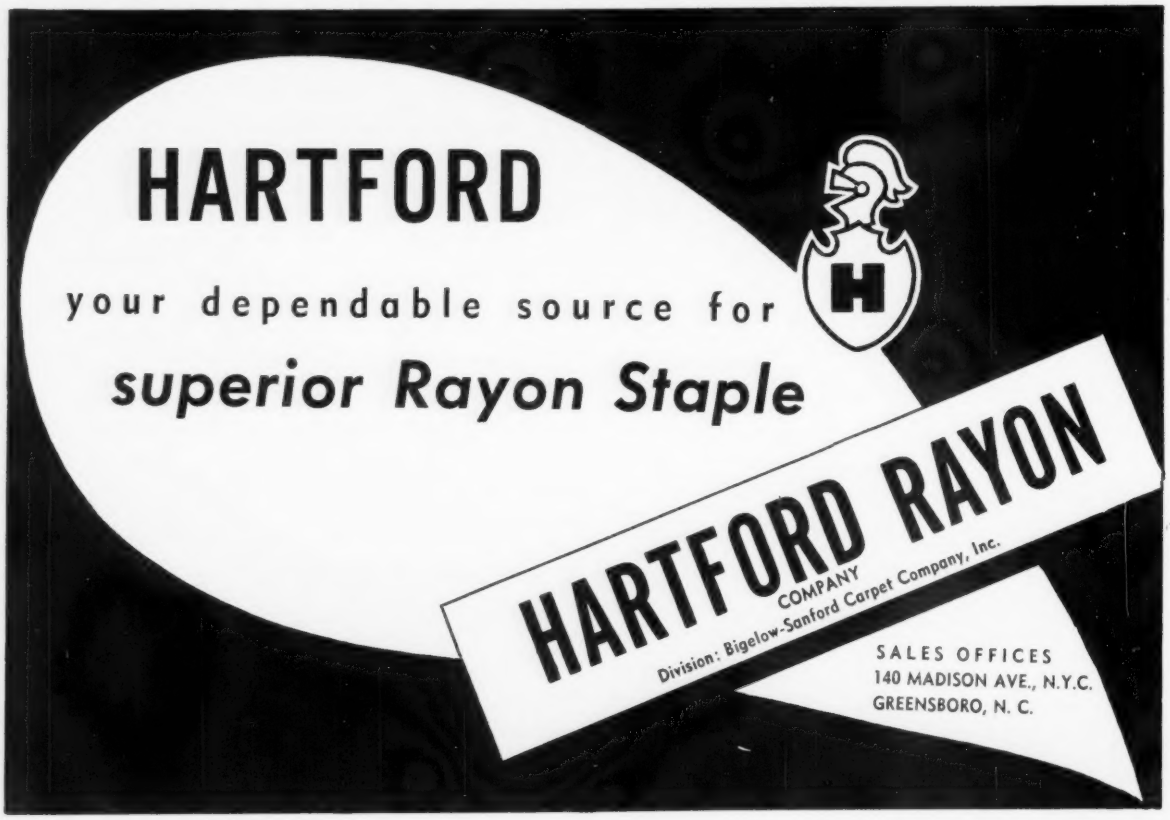
Producing a lightweight woolen by blending soluble fiber with wool in a conventional process, then washing out the cotton to leave a fabric with many tiny air spaces. The result, he said, is "increased warmth from a very light, lofty material".

Providing open-work fabrics and novelty effects by alternating soluble yarns with regular textile materials in weaving.

Avoiding seam-pucker, caused by different rates of shrinkage of fabric and sewing thread, by using thread that contains some soluble fiber. "On laundering, the soluble fiber disintegrates and enables the cotton yarn in the thread to adjust itself when it tends to shrink", Dr. Reid explained. "If the ply is properly designed, taking into account the shrinkage of the fabric as well as that of the thread, the seam will still be flat without the undesirable puckered appearance."

Stretch Hose Gains in Europe

European hosiery manufacturers are following the trend toward more seamless stretch hose, but are not yet convinced that it is more than a fad, according to the export manager of an American machinery manufacturing company. M. P. DeLeo, export manager of Morris Speizman Co., Charlotte, N. C., returned last month from an extended tour of European hosiery mills. He spent four weeks on the continent in order



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to find out first-hand the present situation and future possibilities for conventional seamless and seamless stretch hose on the continent.

Most of the mills visited in all parts of West Germany were quite large, almost all having been built since the war. They are run on latest production methods, comparable to those of the United States, Mr. DeLeo said. The quality of the work turned out in these mills was exceptionally good, he found. All the mill executives with whom he talked were well acquainted with the current trends toward seamless stretch hosiery knitting machines.

However, most of the executives have some reservations as to the continued popularity of seamless hosiery, according to Mr. DeLeo. Consequently, they prefer that machinery be versatile. It should be able to produce conventional seamless hose, "imitation full fashion", or stretch seamless hose.

Most of the men's and children's hose manufactured in the mills, DeLeo visited, use the double cylinder Komet type machine, with production mainly in gauges of 36 gauge or coarser. Many of these same mills also produce full length ladies' hose, primarily for use during the extremely cold winter months. These, in addition to being practical, are attractive, particularly when worn with appropriate costumes.

Perlon is used extensively and one mill produces exquisitely luxurious full fashioned 90 gauge hose. DeLeo found considerable interest in the Sarco boarding machine for men's and children's goods, as many mills are still using steam presses and steam boxes. He was accompanied on his tour in Germany by Dr. Hermann Donner, Speizman representative in Germany, formerly president of Seyfert and Donner Company of Chemnitz. In Belgium and Holland Mr. DeLeo was accompanied by members of the firm of D. A. De Knegt S. A., Amsterdam.

Coated Nylon Tarps Gain

Coated nylon truck tarpaulins will eventually replace cotton duck, according to Paul F. Tuerk, president of Aero Canvas Products, Indianapolis. Mr. Tuerk stated that more than half of Aero's tarpaulin production is being specified in coated nylon by truck operators.

Vinyl coated U. S. Fiberthin center sections with neoprene coated front and back sections make the most serviceable tarpaulins, according to the company. Neoprene and vinyl coated U. S. Fiberthin are said to be lightweight, high strength coated fabrics. Both are patented and produced by U. S. Rubber Co. Although the initial cost of coated nylon tarpaulins is higher than treated cotton duck, the total cost is said to be less because of longer life, fewer repairs, ease of handling, and increased pay load because of less weight.

James Lees Liquidates Worsted Yarn Division

Closing and liquidation of its Worsted Yarn Division was announced by James Lees and Sons Co. The decision will affect about 275 employees. The discontinuance will be accomplished in the next few months when existing orders have been completed.

Lees have been manufacturing worsted yarns, hand knitting yarns and worsted carpet yarns for 42 years. The company's main product today is tufted and woven carpets with the Carpet Tufting Division at Bridgeport.

Employees whose jobs are being discontinued will receive separation and vacation payments totaling more than $200,000, the company announced.

President Joseph L. Eastwick in explaining the action said that the worsted operation continued to be unprofitable despite a modernization of plant and equipment five years ago.

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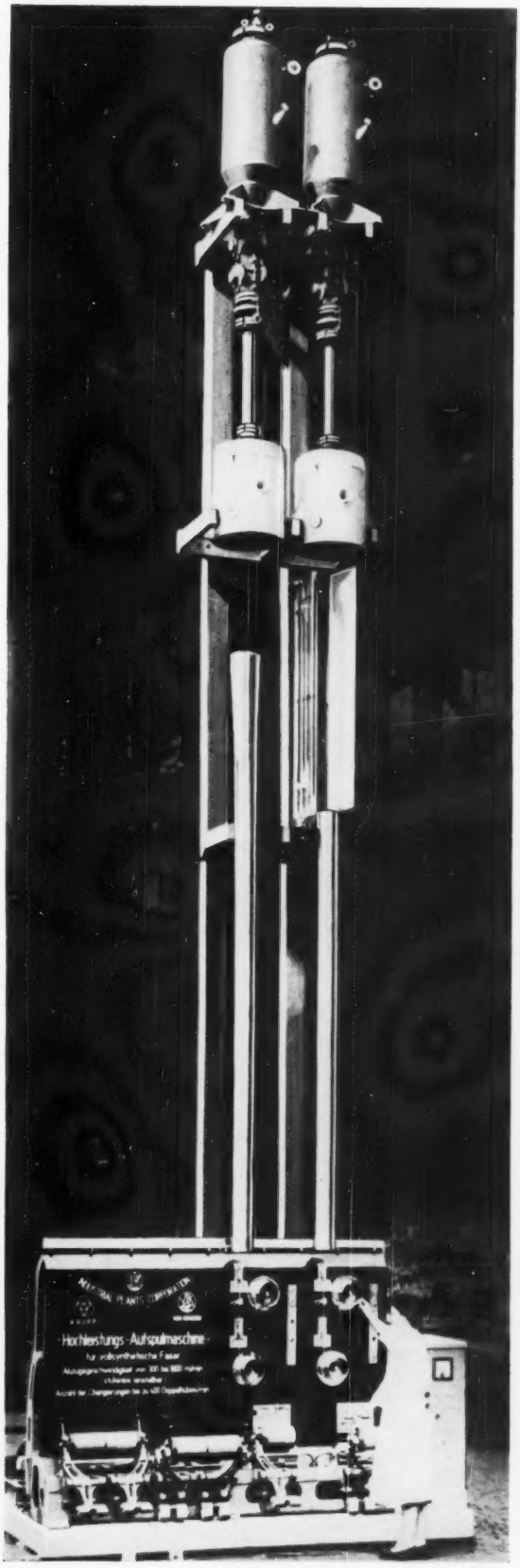

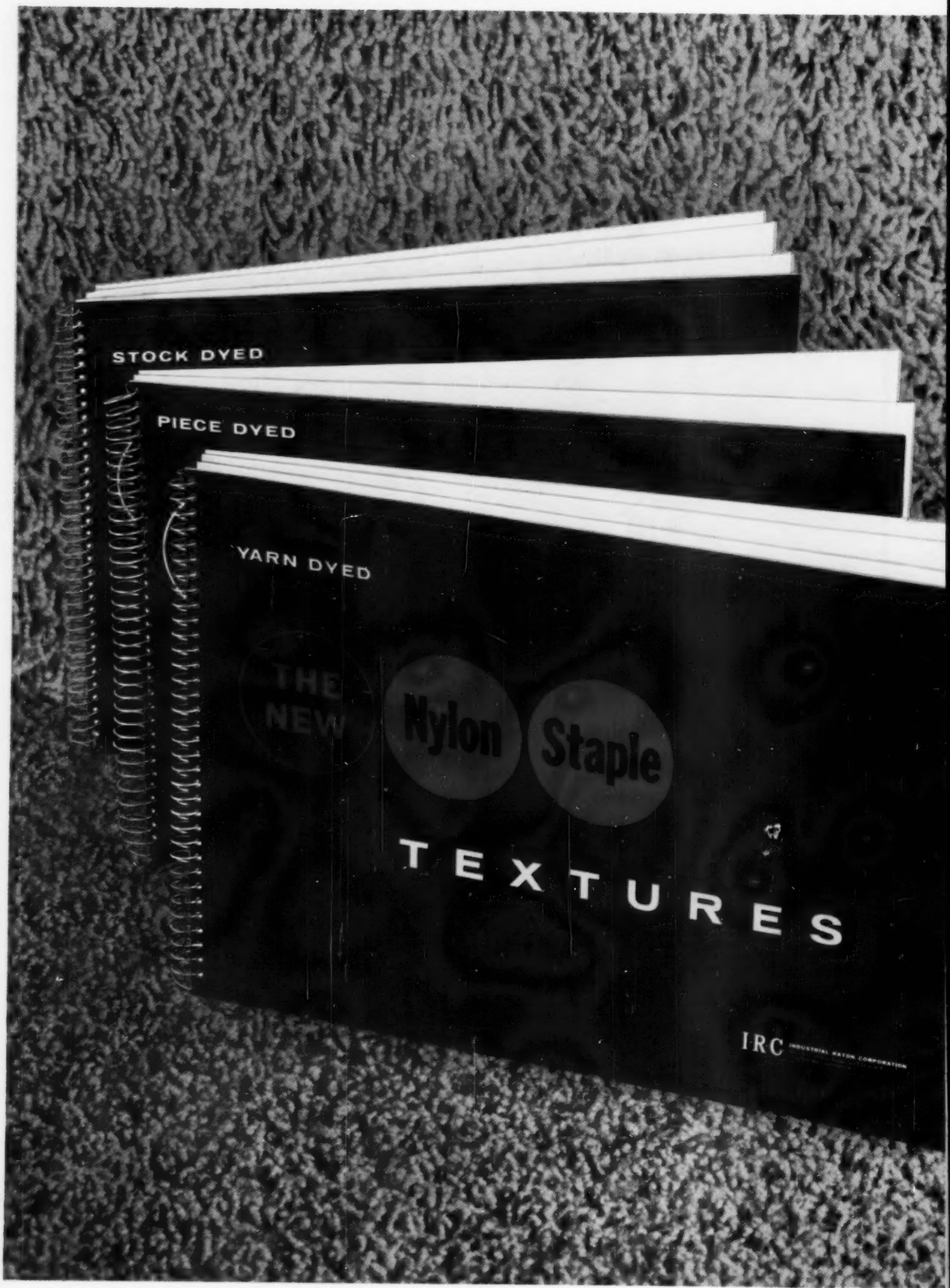
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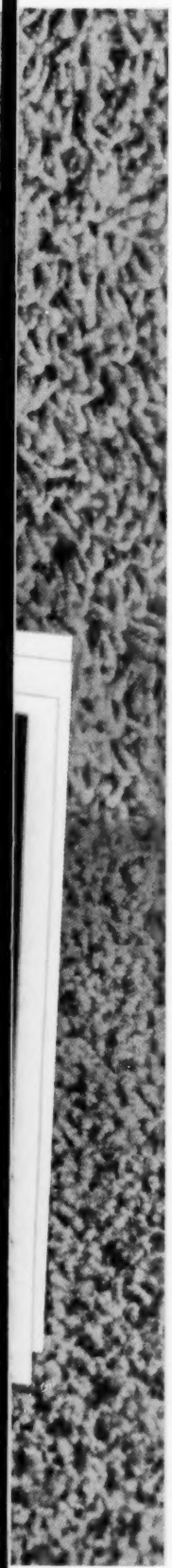

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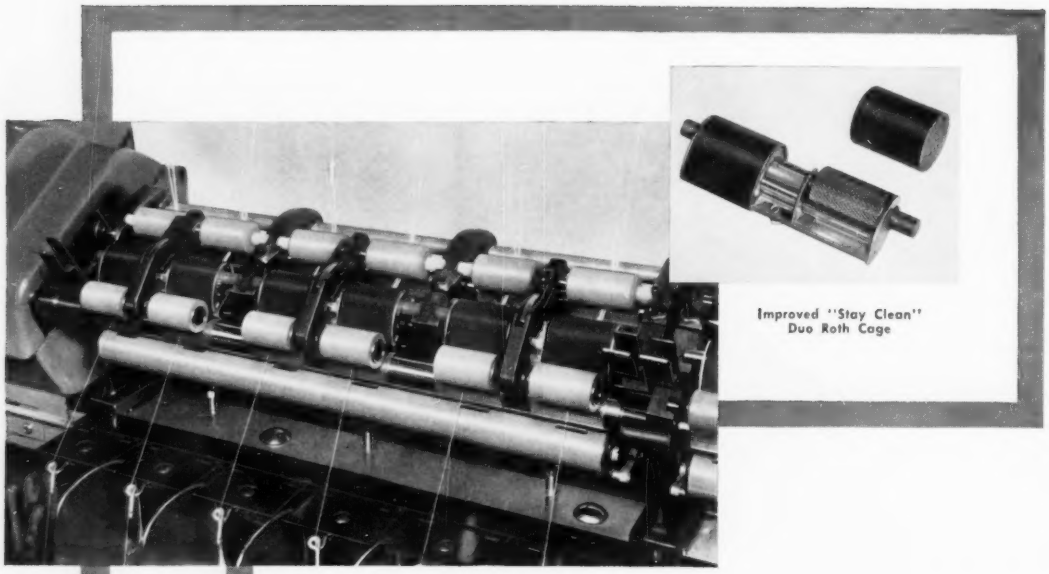

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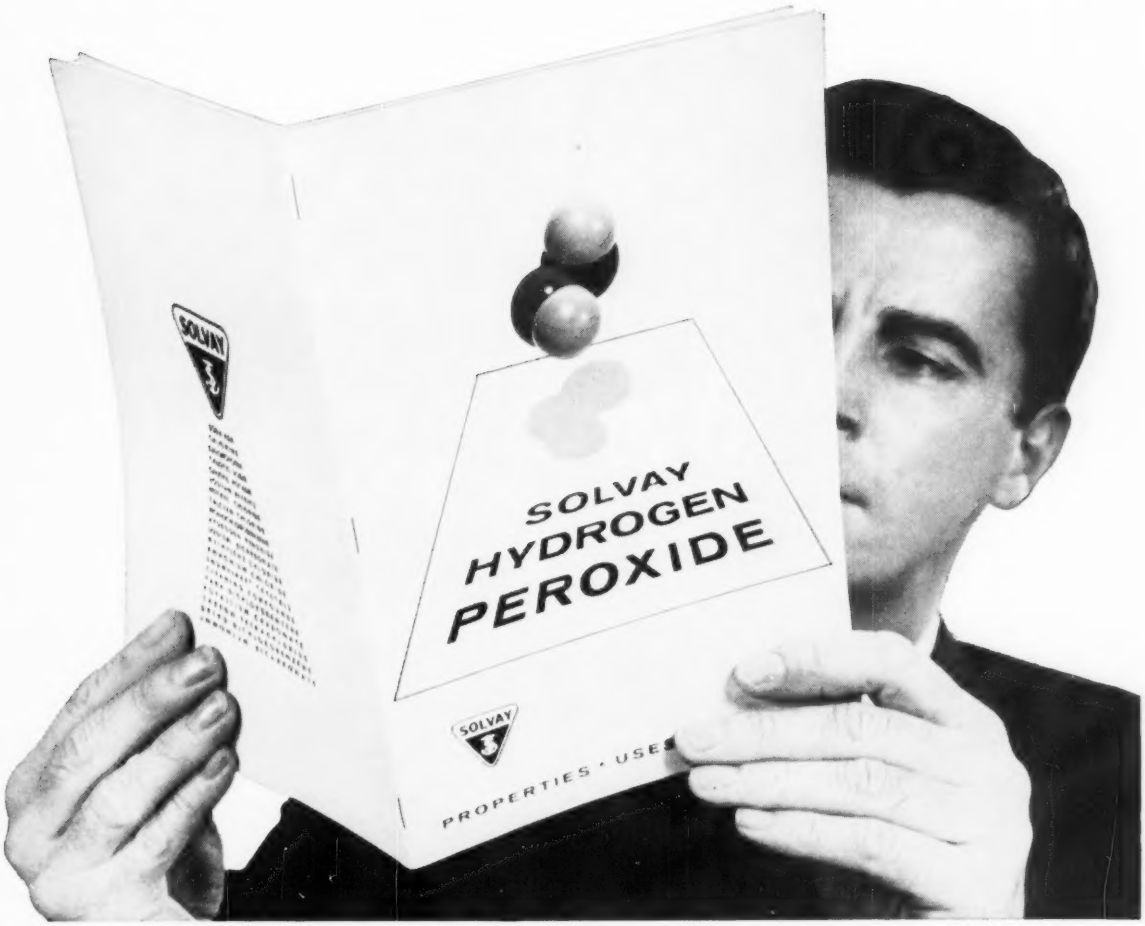

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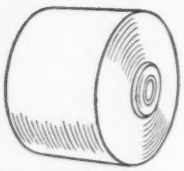

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The new Barber-Colman Type "DW" Warper shown above will wind slasher beams as large as 40" head. It has all the features of the familiar Type "VW", plus several new ones such as a pivoted comb support which moves the comb forward as the beam fills. The driving drum, clutch, brake, and motor — all of which are larger and more rugged to handle the heavier loads — are now arranged back of, rather than beneath, the beam. The creel shown is not the new Type "DC" Creel but is the standard Type "VC", as the new Warper can be used with either the large *or* the standard package. *For further details, please write for descriptive literature, or ask your Barber-Colman representative.*

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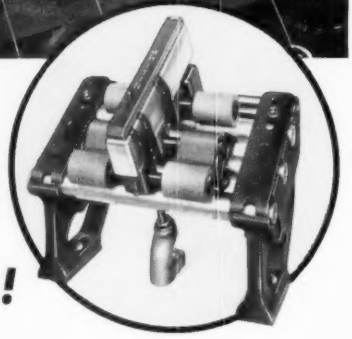

Above — Mill installation of UNITROL.
Right — Detail of new unit and rolls.

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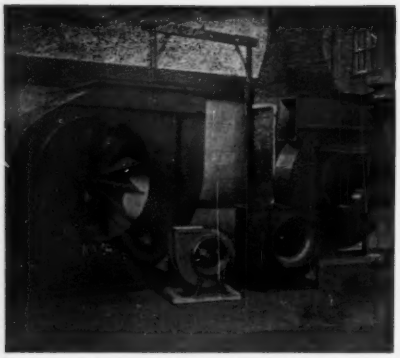

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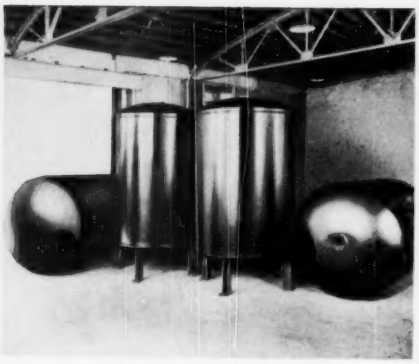

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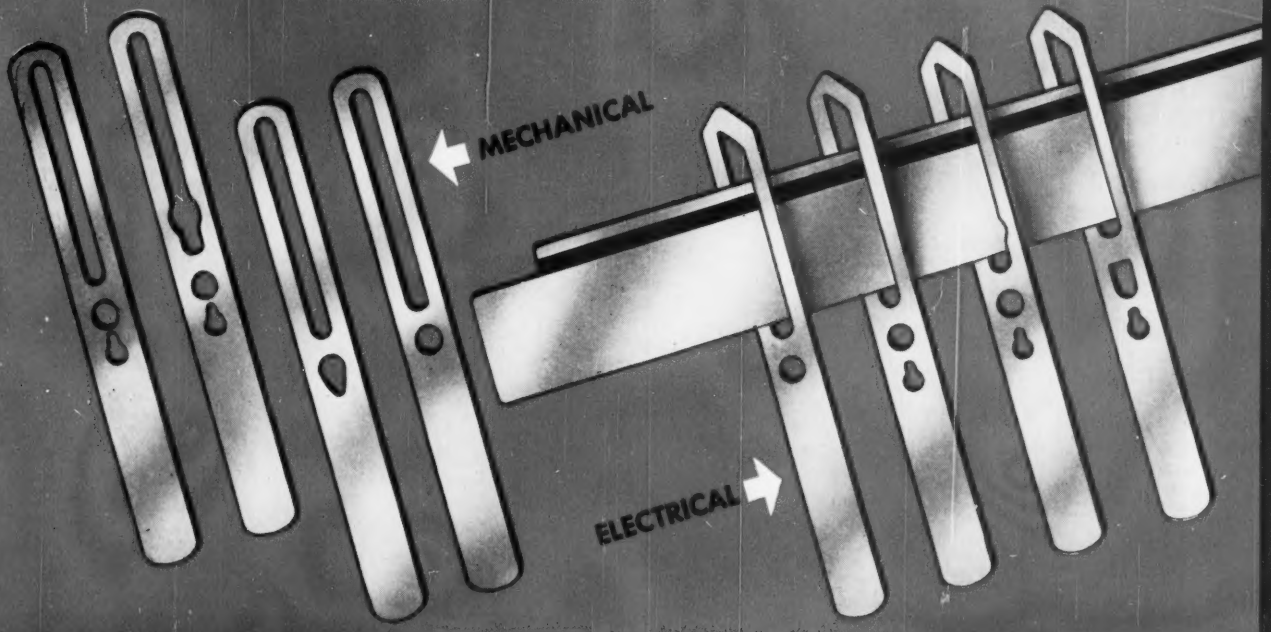

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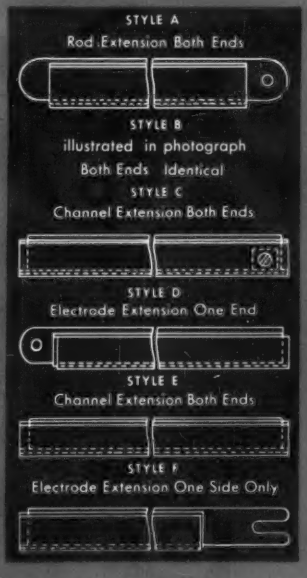

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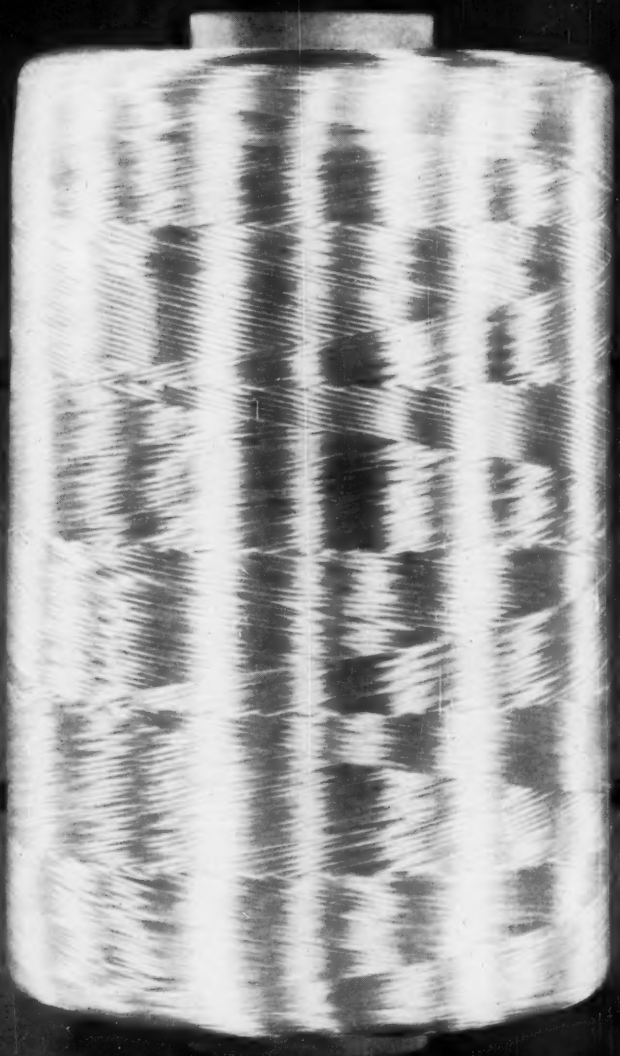

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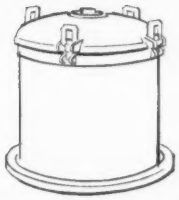

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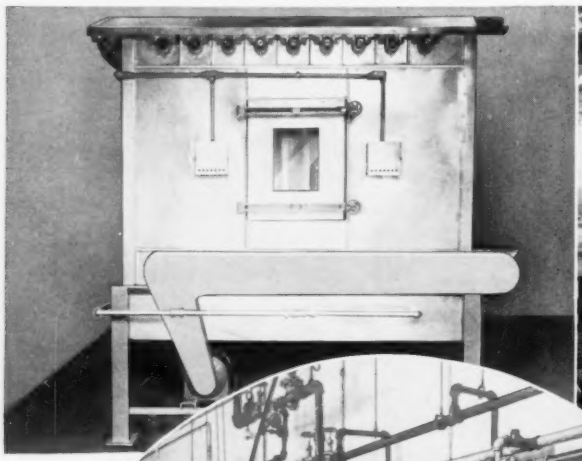

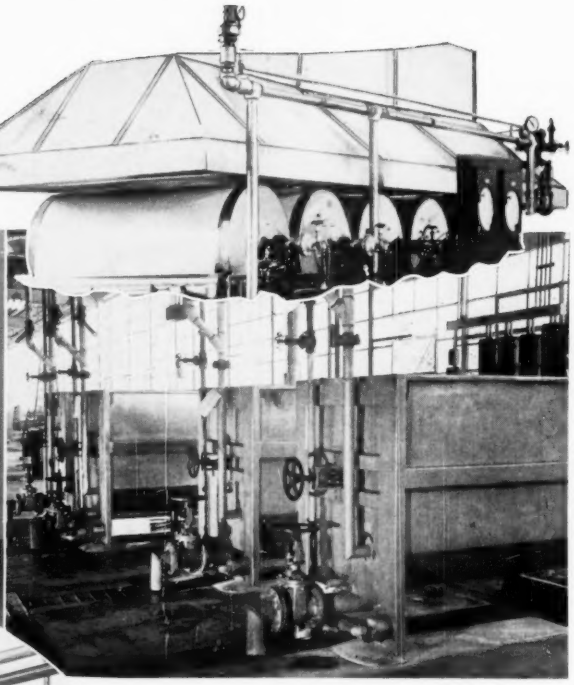

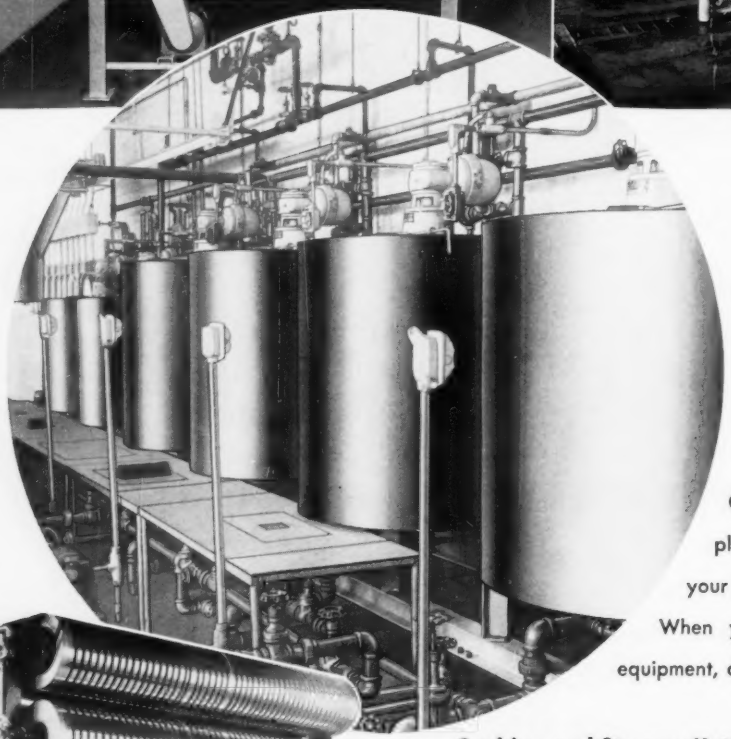

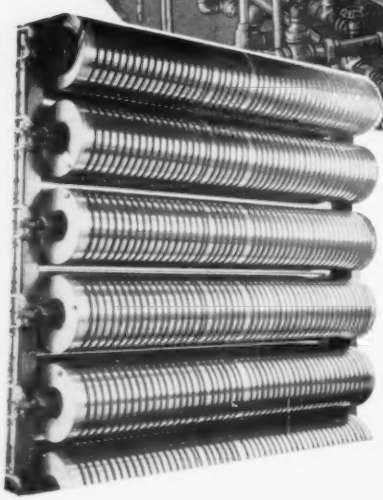

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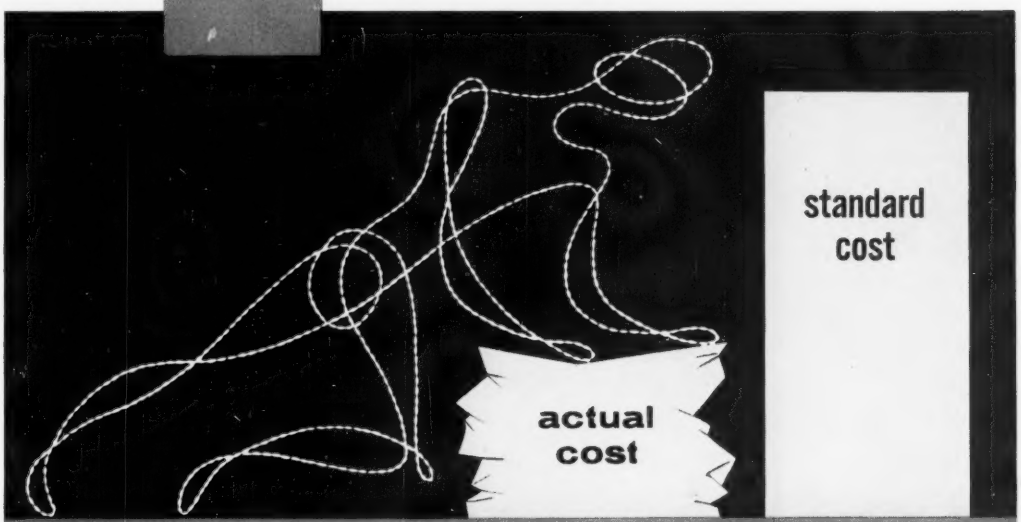

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MODERN
TEXTILES MAGAZINE

May, 1956
Volume 37, Number 5

Publisher's Viewpoint

Are We Telling Our Story to the Right People?

A swing around textile centers in the South was completed recently by the writer of this page. His tour took him to scores of mills, and he spent many hours talking with mill management men. It is sad to have to report that some of these conversations were disturbing to a man who has, as does the writer, great faith in man-made fibers.

Among many millmen the writer found doubts, confusions and misgivings as to man-made fibers and what can be done with them by mills interested in making good fabrics to sell at profitable prices. This atmosphere of doubt and apathy was in sharp contrast with steadily growing interest in these fibers that had been noted among cotton mills in trips to the South in recent years. Something had happened to shift the minds of millmen away from growing interest in and willingness to try the new fibers.

To put the matter bluntly, the writer found that cotton was king again in the minds of men who operate some of the most important mills in the Southern textile areas. The writer also found that among men who make and finish fabrics there is a regrettable lack of knowledge of the true qualities of man-made fibers and how they can be processed into serviceable and attractive fabrics. The conclusion appears inescapable that, while the fiber producers are spending vast sums to tell their story to the ultimate consumer, they are minimizing the most vital links in the chain of distribution from fiber or yarn through finished fabric.

Pick up any popular magazine intended for women or for the general public. There is a good chance that you will find in it many full-page advertisements in color paid for by yarn producers showing beautiful clothes, rugs and drapes made of synthetic fibers. Such advertising has its place. No doubt, it helps to awaken consumer interest in man-made yarns and fibers. But alone it cannot do the job for these yarns and fibers that must be done if they are to continue to prosper. Consumers, it cannot be repeated too often, do not buy fibers and yarns. They buy fabrics made up into apparel and other end products.

It is important to sell the consumer on the advantages of man-made yarns and fibers. But it is even more important to constantly sell the millman, the converter, the dyer and finisher. Unfortunately some of our most important yarn producers decided some time back to eliminate trade advertising directed to mills, converters, dyers and finishers and beam their promotional and advertising messages directly to consumers. These tactics overlooked the textile industry's special ways of doing business and special problems. Such tactics may be useful in selling automobiles, soap, canned soup or cigarettes. But they are not working in the case of man-made yarns and fibers.

What is needed by the man-made fibers industry is a continuous, stronger, more informative effort to tell the millmen who make and finish fabrics what they want to know about these fibers. These men want not extravagant fancies, but useful facts as to how to translate fiber properties into quality fabrics which they can merchandise at a profit.

A. J. McCullough

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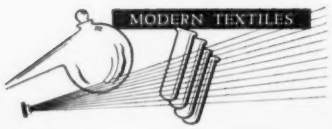
OUTLOOK



in textile marketing

By Robert C. Shook
Textile Economist

Time to Look Ahead—Textile producers at all levels would do well to look at some of the long-term trends within the industry. These long-term trends can be measured in different ways.

1. The relative success of textile and apparel items at the retail level in competition with other types of consumers' goods.
2. Per capita consumption of different types of fibers, particularly in relationship to research and selling expenses.
3. The cycles of textile fiber consumption, which over many years have repeated themselves with a considerable degree of regularity.

Competition With Other Products—The textile industry has been criticized recently, in terms of its general advertising and marketing programs. Advertising and marketing agencies particularly have emphasized the extent to which textiles and apparel have lost out in terms of total sales to consumers' durable goods.

What merit do these criticisms have?

Some relative loss, in a period of rapidly rising income is only to be expected. Families moving up the income scale are bound to increase their expenditures more rapidly for new products and services, which could not previously be afforded, than they do for food and clothing items, which are a familiar budget problem.

Some of the criticism, however, may be justified. Every textile producer should be examining his own program of marketing in relation to all competitive factors. With consumers trading up, and with the styling influence in fabrics and garments more important than in many years, it does seem that textile and apparel producers can bid more strongly than they have for the consumers' dollar.

Consumption Trends—Producers of man-made fibers have established substantial budgets for research in fiber development, finishes, and fabric constructions. They have recognized the importance of the consumer and the retailer, and within a period of a decade have built up their advertising and promotional budgets to impressive levels. Difficulties have been encountered and every producer is inclined to review these programs and question the results. Have they truly been worthwhile?

Per capita consumption figures indicate that they have been. Latest figures for 1955, compare with 1913, show per capita consumption of wool and cotton, the established fibers, more or less unchanged from the beginning of the period to its end. Most of the fluctuations in per capita consumption have been due to the war-time periods which have intervened. The total for the two fibers was about the same in 1955 as it had been in 1913, or in the neighborhood of 29 pounds per capita.

Synthetics Have Made Gains—During this period, however, millions of dollars have been spent in developing new fibers, first rayon and acetate and later the non-cellulosics. These research expenditures have paid off in a net increase of about 10 pounds per capita in present day fiber consumption.

This increase of approximately 10 pounds per capita is the by-product of research expenditures at the technical level. This represents the activity of companies, in the main, which are not essentially textile producers, in the sense of providing fabrics or finished products. The gain in per capita consumption, therefore, is related indirectly to basic expenditures for research, which have paid off over this long-term period.

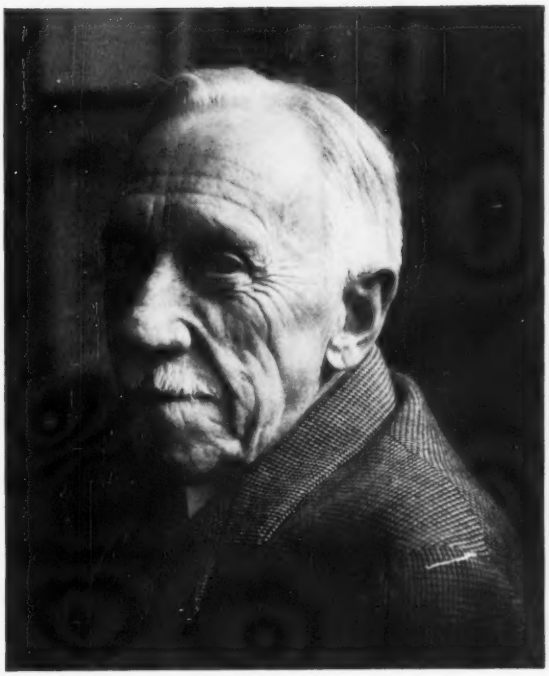
Spending at the advertising and promotional level has also increased tremendously, particularly during the last decade. Most fiber producers' merchandising programs are being drastically revised, and the expenditures connected with them will probably produce more in terms of competitive sales in the next few years than they have in the past.

(Continued on Page 50)

After a lifetime making jute yarns James Malcolm, at the age of 70, plunged into an entirely new field —yarns spun from man-made fibers. In doing so the "dean of jute spinners" showed that he is

Never Too Old To Learn

By Jerome Campbell
Editor, MODERN TEXTILES MAGAZINE



IN RECENT YEARS, the rapid and sweeping changes in textiles brought about largely by the newer fibers have altered radically many a seasoned millman's ways of thinking and working. In few cases have the changes been so dramatic as in the spinning business headed by James Falconer Malcolm, one of the best-known jute spinners in the United States.

In the realm of staple textile products, there are none more staple and less burdened with change and style fluctuations than jute. Back in 1950, James Malcolm was doing well, spinning jute carpet yarns in his neat and prosperous Revonah Spinning Mills located in the tidy little town of Hanover, Pa. His jute carpet yarns were the best on the market and he had no trouble selling them to carpet manufacturers throughout the United States.

Malcolm had just passed his 70th birthday, and had many good reasons for being satisfied with his jute business. An outsider might have thought that there was little reason for him to turn to a new area of activity in spinning, but that was just what Malcolm decided to do. At an age when most ordinary men would have been thinking of retiring, he chose to plunge into the manufacture of rayon and other man-made surface yarns for carpets. He explains his decision this way:

"In business, I have found that no matter how successful you are, you can't stand still. You have to go forward and grow. In setting up a whole new division of my company to make pile yarns, I saw a chance to [illegible] to diversify and thus strengthen our business by lessening its dependency upon good old jute backing yarns."

But Malcolm did not begin to manufacture rayon surface yarns just for the sake of doing something new. "It has never been my policy," he explains, "to rush into new things just because they are new. I must be convinced that the new thing is better than the old, or in some way necessary and wanted, so that its manufacture will be profitable."

In the case of rayon surface yarns, Malcolm, six or seven years ago, was closely informed of the strong interest in rayon then spreading through the carpet industry. As a maker of jute backing yarns he had frequent contacts and many warm friendships with carpet manufacturers. He knew that, even though devoted to wool as most of them were, they were deeply concerned over their inability to get the rare tough wools from the Near East and from India and Tibet needed to make good carpets. In those years, the carpet makers were turning toward rayon out of sheer necessity to survive.

Hence Malcolm felt convinced that there would be good profits in the future for the spinner who gained a head start in producing reliable yarns of rayon and other man-made fibers. The next step was to decide how to go about making these yarns. As an old jute man, Malcolm was partial to the flax system of spinning. He listened with keen interest one day when a young business associate, William W. Crawford, now with Celanese, announced that he knew where some usable flax spinning machinery could be picked up. Crawford himself was eager to see Revonah go in for spinning synthetic surface yarns, and his enthusiasm for this new departure had been an influential element in bringing Malcolm to the point of decision.

Together they journeyed up to Actonvale, Quebec, where the machinery was standing unused in a mill. Some trials were run and the spinning frames proved satisfactory. Shipped down to Pennsylvania it served to get Revonah started in the difficult business of spinning man-made fiber surface yarns.

It is one of the firm axioms of James Malcolm's life that if a thing is worth his doing, he must do it well—better, in fact than anyone else. In making jute carpet yarns, he had been successful in living up to his axiom. He determined to do likewise in his new venture. He devised a system of blending based on his own experience and his own ideas. In doing so, he utilized for bins sections of silos intended for grain storage. He put in proper air conditioning equipment and an air suction system for keeping his spinning frames clean.

Flax System Produced Good Yarns

His use of the flax system, with which American yarn spinners are largely unfamiliar, caused some surprised comment in an industry accustomed to spinning yarns on the woolen system. But Malcolm's flax system, as modified to suit his needs, worked out well. The system handles longer staple than the cotton and woolen systems and, in Malcolm's opinion, yields a stronger yarn with less twist. In spite of the skeptics' dim view of the flax system, carpet manufacturers liked Malcolm's surface yarns, and each year since Revonah began to make them, sales have doubled. Currently, surface yarns account for 40 percent of the company's sales volume.

His decision to employ the flax, or linen system as it is sometimes called, was an understandable one for James Malcolm. The jute system, with which he has had a lifetime experience is close to the flax system. Both jute and flax are closely tied up with Malcolm's life and the life of his ancestors most of whom were yarn spinners for many generations back.

His great grandfather, far back in the 18th Century, was a flax spinner in Scotland; and his grandfather, George Malcolm, having been raised in the flax spinning trade, was one of those early Scotsmen who saw the possibilities of jute. Grandfather George put his skill and knowledge as a flax spinner to work producing jute yarns and twine in a company established in Dundee, the city which was to become the center of the jute manufacturing trade.

Founded in 1851, this firm, Malcolm, Ogilvie & Co., "thrived amazingly," in the words of an old framed testimonial now hanging in James Malcolm's office. By 1864, only 13 years after is was established, the company employed a thousand "hands" and it continued to thrive long after the death of George in 1897 at the ripe old age of 87 years.

Along with the jute factory, grandfather George's family "thrived amazingly" too. He had 16 children, many of whom were trained in jute spinning. One of these was David Malcolm, father of James. Working in his father's factory he learned jute spinning skills thoroughly. But looking around at his numerous brothers and sisters, David understandably concluded that Scotland was getting a little crowded.

He decided that there was opportunity across the water for a man skilled in jute manufacture. James Malcolm was 11 years old when his father took him and the rest of the family to the United States. Father David Malcolm became manager of the Allentown Spinning Mills which, along with the Linen Thread Co. of Paterson, N. J., was part of the Robert Barbour interests. Years later, James' brother, David Leonard Malcolm, became president of Linen Thread, a position he held until his retirement a few years ago.

Young James, transplanted from Scotland to the receptive soil of Allentown, Pa., soon acquired all the ways and interests of an American boy, and the Scots burr in his speech softened and almost entirely disappeared. He went to Lehigh Prep School until he was 19. That year his father became ill, and it was necessary for young James to earn his own living.

Always a stickler for quality, Malcolm, when he founded Revonah Mills, insisted on the best machinery then available

Seeing who his father and his grandfather were, it was inevitable that he should go to work learning how to spin jute in the Allentown Spinning Mills. As a mill hand at the turn of the century, James Malcolm started working, he now recalls, at 6 A.M. and knocked off 12 hours later at 6 P.M. On Saturdays, he worked until three only. Sundays were his own except for the time spent in attending not one, but three church services.

For a long, hard 12 hour day Malcolm was paid about 35 cents, he remembers grimly. Consequently, unlike many oldsters, he does not think the old days were better than the present. Life today is a lot more pleasant and livable than when he was a boy, he says.

But the long hours and hard work had their value. Malcolm learned *by doing* a vast amount about spinning jute yarns and twines. His devotion to his job, and his ability to learn were rewarded by steady promotions. By 1904, he was assistant superintendent, and he felt that his salary of $108.33 a month was ample for him to marry.

He remained with Allentown Spinning until 1912 when he accepted a job at $4,000 a year as superintendent of the jute mill operated by the John T. Bailey Co., in Philadelphia. A year later he went with Chelsea Fibre Mills as superintendent of its big old plant on the banks of Newton Creek in Greenpoint just across the river from midtown Manhattan. Here his salary was $6,000 a year, along with a car and chauffeur to shuttle him back and forth between the mill and his home in Flushing, L. I. He remained at Chelsea for six years, rising from the post of superintendent to the position of "mill agent" which is an old-fashioned term to describe the function of general manager.

On Call 24 Hours a Day

Chelsea manufactured a wide variety of jute products, including cordage and twine as well as carpet yarns. It was an old mill, and its equipment was old and badly worn. Malcolm did his best to turn out the highest quality yarn and twine with the mill's outmoded machinery. It was an arduous and exacting job, and it was not for nothing that the company provided the car and chauffeur. At all hours of the day and night, Sundays as well as weekdays, Malcolm would be called to solve some crisis at the plant and the car would hurry him in from Flushing down to Greenpoint.

In those days, as he is now, Malcolm was a stickler for quality and for the most efficient machinery. Hence the noisy, heavy, battered equipment at Chelsea gave him many a bad hour. By 1919, he felt that he had suffered long enough at Chelsea, trying to make good yarns with poor equipment. He resigned and for awhile worked as a consultant to jute mills in matters of time study, efficiency and production.

A year later he was back again working for the Barbour family in the Linen Thread Co. For Linen Thread, he installed a new plant in Paterson, N. J.,

(Continued on Page 50)

Cinderella of the Synthetics

Polyethylene fiber today

Part I

By Victor L. Erlich
Director of Research,
REEVES BROTHERS, INC.

In "three dimensional" fabrics and other new end uses in textiles and plastics, there is today fresh interest in polyethylene yarns. We present in two parts a broad report on polyethylene and its uses by a leading authority

RATHER suddenly polyethylene has become one of the most talked about plastic materials. This has been prompted by two events. The first was the cancellation in 1952 of the agreement between Imperial Chemical Industries and Du Pont which opened the way for companies other than Du Pont and Bakelite to enter the field of polyethylene production; this refers to the original high pressure process of I.C.I. Secondly, new methods of low-pressure polymerization came into the spotlight in 1954 and brought additional projects into being so that two different types of polyethylene will now be available.

The prospect of a total production capacity in this country of perhaps one billion pounds within two or three years causes some anxiety, in spite of the confidence expressed by leaders and analysts that the existing markets are due to multiply and that new outlets will be found with polyethylene plentifully available.

Ten years ago, and with facilities to produce less than one tenth of that now to be expected, a somewhat similar situation existed. When polyethylene had become available in 1939 in England and then in the U.S., the newly constructed production facilities barely met the war requirements primarily for high-frequency cables in radar equipment and for insulation of submarine telephone cables. However, at the end of the war civilian markets had to be created to absorb the then existing capacity. The applications found mainly for cable and wire insulation, films, tubing and molded products, steadily developed in volume. Within a few years these applications not only absorbed the production capacity but made increases necessary.

At the same time the emergence of the new fully synthetic fibers entered its phase of big scale production. Nylon, followed by vinyl—and vinylidene—polymers, Saran in particular, were the pacemakers. It has taken many years of experimental work before acceptable fibers could be presented to the textile market.

Polyethylene filaments, on the contrary, could be easily obtained by melt-extrusion and cold drawing to give a fiber which is sufficiently strong to be processed on conventional textile machinery. Although low melting point, lack of dimensional stability and hydrophobicity precluded various applications, particularly in the apparel field, the chemical inertness, water-, spot- and mildew-resistance, toughness, flexibility and resilience seemed to be suitable properties for other uses more or less related to textile products.

With these and other possibilities in mind, several concerns started limited production of polyethylene monofilaments as early as 1946. Pioneers still active in the field today were The National Plastic Products Co. and Reeves Brothers, Inc. to be followed in more recent years by others such as Firestone Plastics Co., Dawbarn Brothers, Inc., Bates Manufacturing Co. in this country, and Courtaulds, Ltd. abroad.

However, the fibers available in first developments did not meet requirements of wear and tear in some applications. This was discouraging for many and restricted the volume of business. Indeed, the amount of resin applied for filament-extrusion, exclusive of wire coating, did not exceed one to two percent of the polyethylene production which reached the 100 million pounds mark in U.S. by 1953.

It is not astonishing, therefore, to find polyethylene commonly discounted as textile material. So little interest existed that polyethylene fibers usually are not even mentioned in surveys; they figure under the item "miscellaneous" in the breakdown of existing and potential polyethylene markets. As happens so often, failures can be turned to advantages because they stimulate intensive research. Results now being obtained on polyethylene fibers and the present new prospects in the polyethylene field could well lead to a re-evaluation of this section of the plastic and textile business.

Manufacture of filaments—I.C.I. type

Molecular Weight

The resin as supplied by I.C.I. and its licensees in U.S. has fiber forming properties when the average molecular weight is at least 12,000.[1] Practically, polymers in the range of between 19,000 and 23,000 up to 26,000 are being used for this purpose, and supplied by Du Pont (Alathon 14, formerly "1") and by Bakelite (DYNH, DYNJ and DYNK).

The average molecular weight figure gives only an approximate indication for the chain length because commercial polyethylene contains an array of molecules of widely different chain lengths. The considerable branching which is characteristic of the I.C.I. resin adds to the uncertainty, and probably the more pronouncedly so the higher the molecular weight.

Extrusion and Melting Point

Extrusion equipment is of conventional type. Single screws are most commonly used with the barrels having abrasion resistant, but not necessarily corrosion resistant lining. Construction of the extrusion

(Continued on Page 46)

Rayon wash-and-wear fabrics

Both spun and filament rayons can be finished to have reliable "minimum care" properties

STRONG evidence that the sales potential of wash-and-wear fabrics is attracting the interest of virtually all producers of apparel fabrics was presented at the annual meeting of the Textile Research Institute in New York City recently.

In a symposium, spokesmen for six major natural and man-made fibers described the claims of their respective fibers for use in "minimum care" fabrics.

According to T.R. Scott, Jr., American Enka Corp., rayon has the following advantages when subjected to resin treatments for dimensional stability and crease resistance:

1) Rayon frequently gains in wet tensile strength following minimum care treatment, while losses in dry tensile are usually slight. (In some cases there is an increase in dry tensile strength.)
2) The tear strengths of fabrics are invariably lowered by minimum care treatments. By use of a softener, either in the bath or in a subsequent operation, the tear strength of filament and staple rayon can be restored, provided the fabric has not suffered irreversible damage due to improper finishing techniques.
3) With respect to acid hydrolysis, which may occur during resin treatment or during chlorine bleaching followed by ironing of a treated fabric, rayon loses little or no strength under conditions where cotton not only loses strength but sometimes suffers irreversible acid damage.

Crease-resistant cellulose fabrics, Mr. Scott said, can be produced by the following chemicals:

1. Urea-formaldehyde (durability to washing questionable).
2. "Modified" urea-formaldehyde.
3. Melamine formaldehyde or modified melamine resins.
4. Formaldehyde plus cellulose ethers, starches, gums, or vinyl copolymers.
5. Glyoxal plus urea-formaldehyde.

Although all of these materials, Mr. Scott continued, "can be made to give good dimensional stability and, in most cases, good crease recovery, some of them have serious shortcomings when their applicability in a minimum care formulation is considered. In addition to imparting a satisfactory appearance after drying, the finish should possess other important characteristics.

"The finish should:

1) Be durable to repeated laundering.
2) Impart satisfactory dimensional stability and hand.
3) Not seriosuly affect tensile and tear strengths or color.
4) Not greatly reduce abrasion resistance.
5) Not be chlorine retentive to any appreciable extent.

"The technical considerations in the application of minimum care finishes are the same as those involved in rendering rayon fabric dimensionally stable and crease resistant. The sequence of operations is usually:

1) Scour fabric and sour is required.
2) Pad fabric through solution.
3) Dry at a comparatively low temperature (250°F.) and calender, if desired.
4) Cure at elevated temperature (320°F.).
5) Wash and neutralize fabric in a relaxed state.
6) Dry relaxed and steam and frame to width.

"The proper control of these operations is vital to the production of high quality merchandise. We have seen examples of variations in the performance of fabrics finished with the same formulation in different mills as well as variations in the results found in different runs in the same mill. The former could possibly be attributed to minor differences in equipment while the latter must be caused in inadequate process control. Cost of treatment, including dyeing, might range from about 8 or 9 cents to 20 cents per square yard, depending upon the type of treatment employed, types of dyes used, and weight of the fabric.

"In addition to selection of the most suitable finish formulation, there are other factors to be considered. For example, fabric construction is fully as important as the finish used. The most satisfactory fabrics are the result of a combination of suitable fabric geometry with a good finish. It has been demonstrated that spun yarn fabrics which are of a loose, open weave and which have a fair degree of crease resistance to begin with are easiest to render crush resistant. Our experience has shown that such fabrics are also more amenable to the introduction of minimum care properties. Also, a wide variation has been found in the performance of various commercial treatments on different fabrics. The fact that a given finish is superior on one type of fabric is no assurance that it will work best on another type."

Mr. Scott then discussed the treatment of filament rayon fabrics to impart minimum care properties. As an example, he cited a 100% rayon French crepe woven with 75 denier rayon filament yarns in both warp and filling. Acid-aldehyde was used as the principal ingredient in the finish formulation. He presented the following table showing properties after washing of this fabric both treated and untreated.

"It can be seen that this fabric has excellent dimensional stability, fair crease recovery, and satisfactory tear strength, both dry and wet. In addition, the treatment reduces the water retention to such an extent that the treated garment will dry in approximately one-half the time required for an untreated garment. This fabric, treated and untreated, was washed and tumble dried.

"After inspection of the garment following washing and tumble drying and after examining the physical properties of tensile and tear strengths, water retention, etc., we might conclude that this fabric meets the requirements for minimum care. When used in women's slips, probably no ironing would be required.

(Continued on Page 37)

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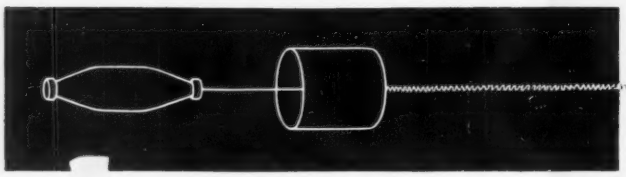
At right are shown just a few of the variety of garments that call for new "miracle" yarns produced on Leesona Stretch Yarn Machines. For full particulars on these machines and on Universal's stretch yarn service, see your Universal representative or write direct.



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TRI Meeting

(Continued from Page 34)

Physical Properties—Viscose Rayon French Crepe, 150 x 94
Warp: 75/60/3Z Semi-Dull Filament Rayon
Filling: 75/60/35Z Filament Rayon

Properties after 10 Machine Launderings at 160°F.	Untreated	Treated
Retention of Dimensions, %		
Warp	96	99
Filling	81	99
Area	79	98
Monsanto Crease Recovery, %		
Warp	43	62
Filling	49	62
1" Ravel Strip Strength, lbs.		
Warp	25	24
Filling	27	22
Trapezoid Tear Strength, lbs.		
Dry—Warp	8.3	4.1
Filling	7.3	3.7
Wet—Warp	1.4	3.0
Filling	2.4	4.5
Water Retention, %		
Warp	103	34
Filling	90	36

If this same material were used in women's blouses, however, they would probably require a light touching up with a hot iron. This is a good example of a case where a given fabric would be "no-iron" in one end use, whereas a light ironing would be required in another end use. In either use, however, the garment would dry faster, have good dimensional stability, and a pleasing hand, and these properties would be present even after repeated washing.

"A continuous filament fabric of this type with a smooth surface represents one of the most difficult types of material in which to introduce minimum care properties. This brings out another important point: Fabrics which have patterns or designs which tend to confuse the eye, such as printed, puckered, or plisséd surfaces, often present little difficulty in introducing minimum care properties because small wrinkles which may be present are not readily discernible to the eye.

"In addition to the almost unlimited possibilities for blending viscose staple with other fibers, there are numerous applications for combination fabrics of spun and continuous filament rayon and other fibers. For example, we have a play clothing fabric woven from a cotton warp and a high tenacity 300 denier filament rayon filling which has excellent minimum care characteristics. Some physical properties of this fabric are given in the following table. A modified urea-formaldehyde resin was used as the principal finish ingredient.

Physical Properties of Combination Play Clothing Fabric
Warp: 18/1 Carded Cotton
Filling: 300/40 Jetspun® High Tenacity Rayon

Properties after 20 Machine Launderings at 160°F.	Untreated	Treated
Retention of Dimensions, %		
Warp	92.4	97.5
Filling	96.3	100.6
Area	89	98
Water Retention, %		
Warp	39	30
Filling	64	44
Crease Recovery (Monsanto), %		
Warp	52	68
Filling	52	61

"It is seen that the treatment has produced good dimensional stability, a lower degree of water retention, and improved crease recovery."

Du Pont Makes Further Changes In Textile Fiber Sales Departments

New changes in the textile fibers marketing set-up of the Du Pont Co. were announced last month. The company is locating a major segment of its textile fibers sales management in the field. As part of the new reorganization regional sales managers have been appointed in New York City, N. Y.; Philadelphia, Pa.; Providence, R. I.; and Charlotte, N. C. They will have direct responsibility for the sale of all five Du Pont fibers in their regions. District offices at Chicago, Ill., and Reading, Pa., and the special industrial sales section presently at Wilmington will now operate under the Philadelphia regional manager. Under the new setup each region will continue to have sales staffs specializing in particular fibers and headed by district managers who will report to the regional manager instead of the Wilmington office.

The action also includes plans for opening a regional sales office at Akron, Ohio, in the near future. This office will handle sales of those fibers used by the rubber industry.

Also announced was another change in the sales organization—the creation of a sales programs division located at headquarters in Wilmington to provide improved internal coordination of sales plans and programs with manufacturing and research. Raymond C. Grills, manager of industrial sales, was named director of the new division, reporting to J. A. Dallas, assistant general director of sales.

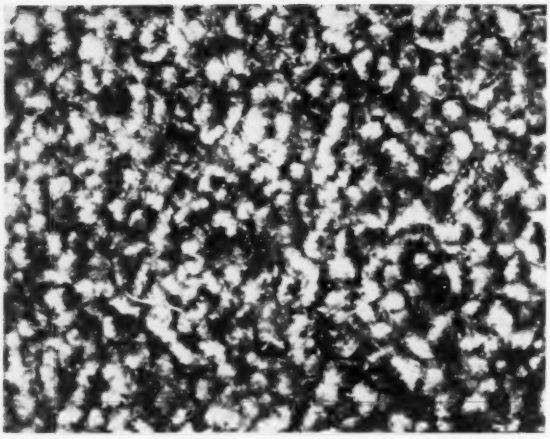
To implement the new regional sales organization, Truman C. Welling, manager of sales for Dacron polyester fiber, was named to a newly created position of assistant director of sales, reporting to A. M. Saunders, director of that division. Richard W. Trapnell, III, manager of women's wear merchandising section, was also named to a newly created post of assistant merchandising director, reporting to Henry C. Froehling, director of merchandising.

New regional sales manager are: Charlotte, Millard G. Gamble, former assistant sales manager for nylon at the Wilmington office; New York, Charles D. Wenrich, former New York district sales manager for nylon; Philadelphia, V. Ward Smith, former sales manager for acetate at the Wilmington office; Providence, H. G. Buckley, former sales district manager for rayon at the Providence office; and Akron, Howard P. Brokaw, former assistant manager for industrial sales in Wilmington. His headquarters will remain in Wilmington until the Akron office is established.

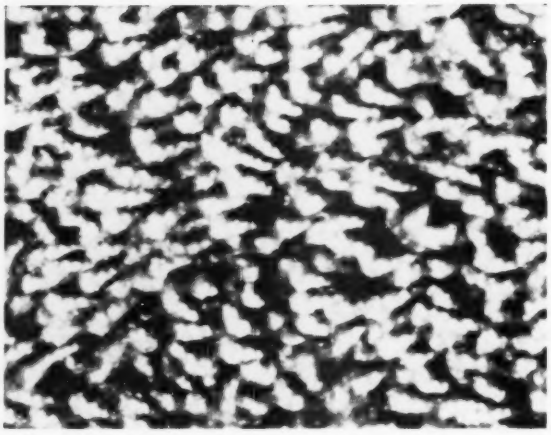
The export sales offices will continue to operate in Wilmington and New York under the direction of L. B. Dennett.

The new managers of the sales programs division are: rayon and acetate sales programs, W. D. R.

(Continued on Page 52)



This all-nylon woven fabric is an example of the hard twist textures obtainable with Industrial Rayon's new process.



Using Industrial's new process, the all-nylon surface yarns in this tufted carpet were given a permanent hard twist texture.

more texture in nylon carpets

New heat setting methods permit richer variety in nylon carpet surface effects

As a result of special heat-setting properties of its nylon staple fiber, Industrial Rayon Corp. announced last month that a greater variety of textured surface effects can be achieved in carpets of all-nylon or nylon blended with other fibers.

The new methods of twist setting, the company reported, may be applied to stock-dyed yarns as well as undyed yarns for piece dyed carpets. The twist setting can also be accomplished while the yarn is being dyed on skeins or packages. If skein or package dyeing is not done, the heat setting process may require an extra step. It is estimated that such an extra step would add about one dollar a yard to the cost of carpet retailing for $9.95, and would be proportionately higher for more expensive carpets.

The flexibility of Industrial's twist-setting techniques makes it adaptable with equal advantage to all types of carpet manufacturing operations for both tufted and woven carpets. A collection of sample textured fabrics, made with yarns twist-set by Industrial Rayon's methods, was shown to the press. Some of the yarns had been twist-set in skeins by a water treatment or by steam while other yarns were set on a package. The types of fabrics shown ranged from those made from low twist yarn, resulting in a tipping effect, through saxony styling to hard and extra hard twist yarns with a high degree of heat setting.

Included in the fabrics shown were several all-nylon carpets knitted on raschel machines. It was reported that a number of mills were experimenting with the production of carpets using Industrial's nylon on raschel knitters.

Charles E. Rodgers, Jr., in charge of Industrial's nylon staple fiber sales, explained that the company, in developing its twist-setting processes, gave major consideration to methods which would allow carpets to retain their original textures over a long period. He said that intensive laboratory tests offer reason to believe that textured fabrics made with Industrial's nylon staple fiber and set by its recommended methods will retain their twist longer than comparable textures of natural or cellulosic fibers.

At the press meeting, samples were shown of unused carpet made with Industrial's nylon heat set under its new processes along with samples that had been cleaned a number of times by conventional carpet cleaning methods.

Industrial's new nylon staple, Mr. Rodgers said, has a set crimp for greater bulk. Yarns made from it can be twist-set at practical moderate time-temperature conditions in existing equipment. The new twist-setting methods will permit substantial control of the bulk in the final face yarns, he explained.

Mr. Rodgers said that Industrial's new processes were being used by a number of carpet tufters and weavers and that it was expected that a variety of these fabrics would be ready for commercial distribution by next January's floor covering market week. Most of the present developmental work is going forward with all-nylon constructions. But, it was noted that the new techniques can be applied to carpets made of yarns blending nylon with rayon or wool as long as the proportion of nylon is "respectable". Such a proportion, it was indicated, could be less than 50%.

"In view of the increasing popularity of the 'textured look' in carpeting," Mr. Rodgers said, "we feel that our new twist-setting methods and the textures they make possible will greatly influence the use of nylon staple by carpet manufacturers." Full information on the company's twist-setting program is being made available to yarn spinners and carpet manufacturers.

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new HIGH-BULKING DYNEL improves knitwear

Children's sleepers have been one of the first successful end uses for the new high-bulk Dynel 63 in blends with cotton. These garments are said to be soft and to retain size and shape after laundering.

A NEW TYPE OF DYNEL, characterized by controlled high shrinkage will widen this fiber's markets, especially in knitwear, according to A. L. Snyder, sales manager for this warmth fiber.

Known as Dynel 63, the new fiber will produce bulking yarns in blends with cotton. Mr. Snyder reported that knit goods of these yarns give a better hand, have more counter appeal and offer more warmth with less weight than either all-cotton or Dynel-cotton blends offered heretofore.

Dynel is made by Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp. Dynel 63 will be available at no change in price from regular Dynel. The new Dynel achieves its bulking effect by reason of a fiber shrinkage of 25% which is taken up in boiling water or a boiling dyebath to produce a stable fabric, Mr. Snyder said. He noted that serviceability tests after repeated wearings and launderings indicate far less pilling than all-cotton.

In making fabrics for cotton-and-Dynel sleepers, for example, a proportion by weight of two to three parts of combed cotton sliver is blended with one or two parts of Dynel sliver in the drawing operation. The blend is then spun into yarn. Knitting of the yarn is done loosely, and the fabric is piece-dyed for color. The dyeing operation produces the bulking. Bulked fabrics are more easily napped than regular fabrics and usually give better cover.

For best quality in production of the new bulked garments, several technical details must be observed, Mr. Snyder said. In yarn manufacture, to produce cotton-Dynel sleepers, T-shirts and similar knitwear for example, the bulk Dynel stock should be parallelized on a card with a fancy. It is blended with the cotton during drawing. Yarn sizes should generally be about 12% finer than would otherwise be used, when duplicating a given fabric. For example, garments or fabrics formerly knit with 22s cotton-count yarn should start with 26s yarn containing high-bulk Dynel.

Piece dyeing of the fabric is done in a closed beck so that it can be held at a true boil. The goods are heated slowly so that a boil is reached in about one-half hour. Dyeing proceeds for one hour at the boil, and then at least 15 minutes are required for cooling, so as not to set wrinkles. Care must be taken to avoid stretching the bulked goods during drying.

Dynel is now being used in children's sleeper fabrics and in fabrics for pajamas and underwear. When these fabrics are made with the new Dynel 66, Mr. Snyder said, the result is a more even and attractive cover than on regular cotton-Dynel blends. Other advantages obtained with the new high-bulk Dynel are a soft hand and excellent stability in size and shape after 50 or more launderings.

The special properties of the new fiber enable it to be used without increase in costs of finished garments as compared with regular Dynel. Although finer and somewhat more expensive yarns are required by the high-bulk blends, this is offset in savings in the faster, looser knitting allowed by Dynel 63. Mr. Snyder reported that already several mills were producing garments for the 1956 season using the new high-bulk Dynel.

Synthetic Fiber Exhibit

New developments in synthetic fibers for industry will highlight the exhibit by Du Pont's Textile Fibers Department at the Design Engineering Show, May 14-17, in Philadelphia.

Among these will be synthetic fiber paper and nonwoven fabrics, mechanically bonded reinforcing batts for plastic laminates, "Teflon" tetrafluoroethylene fiber, and many promising applications for those developments. Although a few of the new products to be shown have reached pilot or commercial production stages of development, most are said to be experimental. According to the company, many of them will be shown for the first time.

Another section of the exhibit will be devoted to commercially available industrial products of nylon, Orlon acrylic fiber, Dacron polyester fiber, and Teflon.

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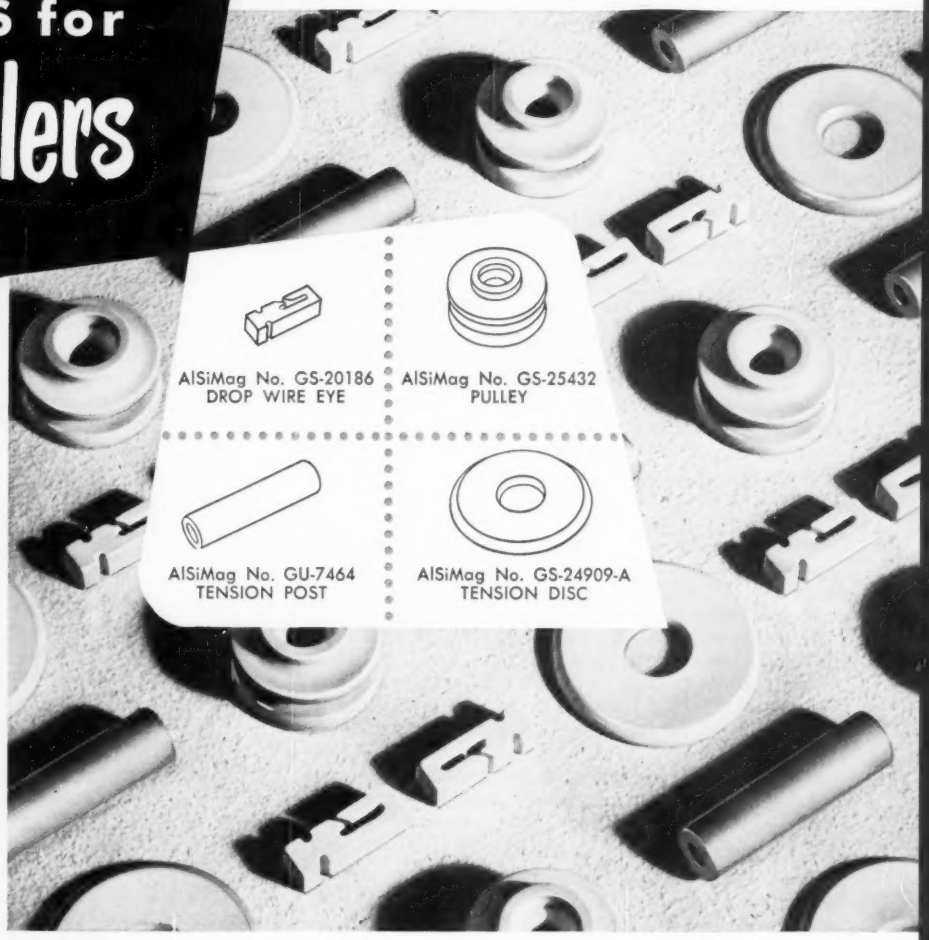

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These tests will give you

BETTER NYLON STOCKINGS

Here are tests to help you control fabric stiffness, yarn liveliness and other factors vital to quality

By Erb N. Ditton

HOSIERY FABRIC STIFFNESS TEST

The stiffness of stockings after completion of the various finishing operations is of considerable importance from the sales standpoint. Ideally, stocking fabrics must not be so stiff or boardy as to be objectionable to the ultimate consumer. Yet they must be sufficiently stiff so as not to become unduly creased during shipment from the mill. It is, therefore, of considerable interest to have available a simple and reliable test method which will measure this property.

A stiffness test can be of even greater value to the dyehouse when used as measure of the uniformity of the application of the finish. Most commercial finishes generally consist of two or more components. Since most of the products used do not exhaust completely in the finishing bath, it is difficult to measure the uniformity of application from lot to lot. The stiffness test will serve as a measure of uniformity since, if all lots have the same stiffness, it must be obvious that the finish has been uniformly applied in each case.

The problem of measuring the stiffness of hosiery fabric is difficult as variations in this property are comparatively small. For this reason the standard test methods used on woven fabrics, of which the Monsanto test is an example, are not applicable. Neither are tests such as the Pierce loop or cantilever test applicable for the reason that excessive curling of the knitted fabric selvages make these tests of no value.

The following method was developed to overcome these objections and has proven completely satisfactory. The method is quick, inexpensive, repeatable and non-destructive.

Method of Making Hosiery Stiffness Test

EQUIPMENT REQUIRED

a—One laboratory ring stand.

b—A clamp for the hosiery which can be attached to the ring stand in place of the ring. The clamp used in the snag test is satisfactory for this purpose.

c—A 12" rule graduated in 16th's of an inch.

d—A table large enough to hold the stocking in a flat condition.

TEST PROCEDURE

a—The stocking to be tested is placed flat on the table and folded lengthwise, making certain that the welt is evenly folded and that the seam in the area of the leg (calf) narrowings just meets the leading edge of the stocking.

b—The stocking is placed in the clamp in the folded condition at a distance of 18" from the top of the welt.

c—The clamp is then attached to the vertical rod of the ring stand at a distance of 24" from the base of the stand and the stocking allowed to hang freely, protected from strong air currents.

d—It will be noted that the two sides of the fold now make an angle with each other and the width across the open part of this angle is measured at a point 12" from the base of the stand and recorded to the nearest 16th of an inch.

e—The stocking is now removed from the stand, folded in the reverse direction and the test repeated.

f—The average of the two measurements represents the stiffness of the fabric—the larger the measurement, the greater the stiffness.

g—The average of the results of three stockings should be used to measure the stiffness of any given lot.

Since the width of the fold angle is affected by the weight of the stocking fabric and particularly by that of the welt, comparisons are only possible between stockings of similar constructions. Comparisons cannot be made, for example, between two 15 denier constructions, one with a 40 and one with a 50 denier welt nor between 15 and 30 denier styles.

The fact that this test method is repeatable and correlates well with the "hand" evaluation of experienced mill personnel is shown by the results of tests given in Tables IV and V. Table IV shows the results of a correlation test while the data of Table V gives the results of repeated tests on the same stockings.

TABLE IV
Correlation Between Laboratory Test and Hand Observation

TEST #	A	B	C	D	E
% Vinyl Resin	0.0	3.0	6.0	9.0	12.0
% Aluminum Wax	0.0	3.0	3.0	3.0	3.0
TEST RESULTS	9.0	20.5	30.3	34.5	36.0
STIFFNESS RATING	SOFTEST				STIFFEST
BY TEST	A	B	C	D	E
BY OBSERVER #1	A	B	D	C	E
#2	A	B	C	D	E
#3	A	B	C	D	E
#4	A	B	D	C	E

The above results show good correlation between the results of the stiffness test and opinions of skilled plant personnel.

TABLE V
Results of Consecutive Tests on Same Stockings

TEST #	A	B	C	D	E
% Vinyl Resin	0.0	3.0	6.0	9.0	12.0
% Aluminum Wax	0.0	3.0	3.0	3.0	3.0
TEST RESULTS					
1	9.0	20.5	30.3	34.5	36.0
2	8.8	17.5	26.0	30.5	33.0
3	9.3	15.8	20.5	22.5	25.5
4	9.0	14.5	18.3	19.0	21.8

It is well known that stockings loose stiffness the more they are handled and the above test results show that the stiffness test confirms this fact. The repeatability of the test method is demonstrated by the fact that the stockings (Test #1) on which no finish was applied show no changes in stiffness due to repeated handling.

YARN TESTS

While yarn tests are most generally made by the throwster or yarn supplier, rather than by the hosiery mill laboratory, there are three simple tests which can be of great value if made by the hosiery mill laboratory. These tests are for yarn liveliness, coefficient of friction and torque of stretch yarns.

I—Yarn Liveliness Test

The degree to which the twist has been set is of great importance in knitting and the higher the twist the more significance it assumes. Improperly set twist will cause the yarn to curl or corkscrew during the knitting operation which either results in a broken thread with the resulting press-off or in the development of fabric defects due to the loops formed by the too lively yarn becoming knitted into the fabric.

The following method provides a simple method of measuring the liveliness of the yarn. No figures can be given for maximum permissable liveliness, as tension and other conditions, humidity for example, vary too much from mill to mill. However, it is a simple matter for the individual mill to determine the maximum allowable liveliness for their own set of conditions which can then be used for checking the yarn as received from the throwster. Thus improperly set yarn can be rejected before it can cause trouble in knitting.

Method of Making Yarn Liveliness Test

EQUIPMENT REQUIRED

1—Two yarn clamps, one fixed and one movable in a horizontal direction from the fixed clamp to a distance of at least 20″. An old twist counter is ideal for this purpose.

2—A weight of from 3 to 4 grains supplied with a small hook by means of which it can be hung on the yarn to be tested.

3—A 150 to 200 grain weight which can be attached to one end of the yarn under test.

TEST PROCEDURE

1—The test apparatus is mounted on a wall at any convenient height so that the direction of clamp movement is parallel to the floor.

2—Clamp one end of the yarn in the fixed clamp, run the other loosely through the movable clamp and hang the 150-200 grain weight on the loose end of the yarn. The movable clamp is then closed which insures that the test will be made under a uniform tension.

3—The clamps are then set 20″ apart and the 3-4 grain weight hung on the center of the yarn.

4—The movable clamp is then slowly moved towards the fixed one until the loop of yarn being formed starts to twist on itself. The distance between the clamps at this point is recorded as the measure of yarn liveliness.

II—Yarn Torque

With the introduction of stretch type hosiery, the torque of the yarn has become of great importance since in those stretch constructions where both S and Z twists—two carrier constructions—are required it is the torque which is mainly responsible for the ultimate degree of stretch in the finished product. As in the case of yarn liveliness, no value can be given for the degree of torque desirable as this depends both on the methods used in preparing the yarn and on the amount of stretch desired in the stocking by the individual manufacturer. However, once this has been determined it is of the utmost importance that it be maintained as otherwise the fabric stretch obtained from different lots of yarn will vary.

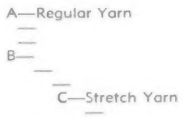
Method of Making Yarn Torque Test

1—Remove one needle from the center of a needle bar on the knitting machine.

2—Knit from 6 to 8 inches of fabric from any regular non-torque yarn.

3—Follow this by knitting the same length of the yarn under test and then remove the fabric from the machine.

4—It will then be noted that the wales—vertical rows of stitches—made from the torque yarn form an angle with those from the regular yarn and the degree of the angle can be clearly seen on the wale where the needle had previously been removed. The appearance will be similar to that shown in the following diagram:



5—Measure the angle ABC with a protractor and use this figure as the measure of the yarn torque. Naturally the direction in which the angle faces will be opposite for S and Z twisted yarn, but if the torque in the two are supposed to be the same then so will the size of the angle.

III—Yarn Coefficient of Friction Test

The coefficient of friction of a knitting yarn is of considerable importance both because changes in the coefficient will result in tension changes during knitting and if the change is too great, it will result in excessive cutting of the knitting elements, particularly the yarn carriers.

Method of Making Coefficient of Friction Test

EQUIPMENT REQUIRED

a—Two metal rods similar to those from a laboratory ring stand and at least 15″ long. These should be mounted vertically on any suitable base at a distance of 20″ from each other.

b—A fixed yarn clamp mounted on one rod 15″ from the base and a movable clamp mounted on the other rod.

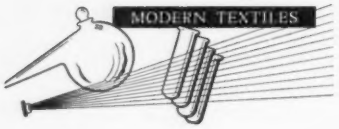
c—An oil cup or section of an emulsion trough mounted on the same rod as the fixed clamp and 1 to 2″ below it.

d—A 3 to 4 grain weight which can be hung on the yarn. The weight used for the yarn liveliness test is suitable for this purpose.

e—A 150 to 200 grain weight which can be attached to one end of the yarn under test.

f—A 15″ ruler mounted vertically adjacent and parallel to the rod to which the movable clamp has been attached.

(Continued on Page 61)



Report from EUROPE

BY SPECIAL CORRESPONDENT

BONN: Following hard on its 1955 record year, the German rayon and man-made fiber industry is counting on another big year in 1956 in spite of the twin threat of a saturating domestic market and increasing foreign import restrictions.

1955—An Amazing Year— Final official figures for last year, released last month, point up the achievements registered by Germany's dynamic man-made and rayon fiber industry. Already Europe's greatest producers of rayon staple, the Germans were able to top the previous year's output by a fat 13 percent, 1955 staple output averaging 12,390 metric tons per month.

Second only to the United Kingdom as Europe's chief producer of rayon filament yarn, the Germans boosted output in 1955 by nearly 10 percent from the preceding year, to a monthly average of 5,710 metric tons. This is considered laudable in view of the fact that European demand for rayon filament has been relatively steady with prices, compared with rayon staple, a bit on the soft side.

Boom Spreads to Man-Mades—Production of true man-made fibers in Germany last year went up 58 percent: from 7,300 metric tons in 1954 to 11,500 tons. Perlon fibers and yarn account for about half of Germany's present man-made fiber production. But acrylic and polyester fibers' output is expected to rise more sharply over the coming months in line with company expansion projects.

The recent perlon market serves as an indication how German man-made fiber producers can shift from one market to another as consumer demand requires—and underscores the reason for optimism this year. About half of Germany's perlon output has been going into the manufacture of hosiery. However, since about mid-1955, and continuing into 1956, the demand for perlon from hosiery manufacturers has eased—and prices have followed the demand downtrend.

Hosiery Market Weakening—It is estimated that enough stockings were turned out in Germany last year to provide six pairs for every German woman over 16. There are more than 100 full-fashioned hosiery plants in Germany. Hose output last year jumped 28 percent over 1954, being calculated at about 100 million pairs (of both perlon and nylon).

German man-made fiber manufacturers swiftly lost their illusions as to the ability of the domestic market to go on absorbing nylon and perlon hose at this swift pace (1954 hosiery output was 33 percent over 1953). Several weeks ago, perlon continuous filament yarn prices were reduced—the first time since the summer of 1954. At that time, the cut averaged 30 percent.

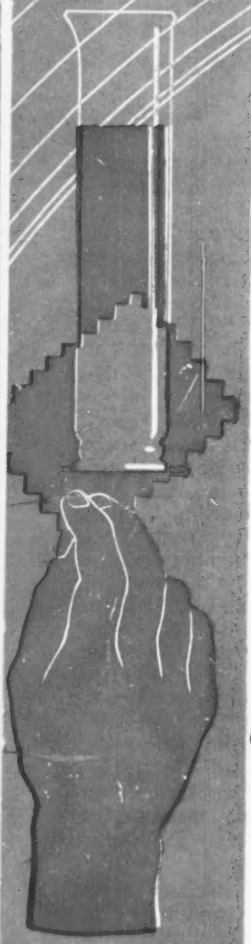
Recent Perlon Prices— This year's price decreases have averaged only 5 to 7 percent. Prices for 15, 30, 45, 60 and 100 denier perlon yarns were all reduced, but 200 denier rose two DM (to 24 DM per kilogram), and 20 denier was unchanged. The revised perlon prices were given as: 54.50 DM per kg for 15 denier; 39.25 for 20; 35.50 for 30; 28 for 45; 24.50 for 60, and 23 for 100.

It is not yet clear whether the price cuts will be able to reverse the recent 5-10 percent decline in German hosiery sales. Many millmen believe the German market is truly saturated. But the trade is not sitting on its hands awaiting the outcome of the price moves. Efforts are underway to stimulate perlon sales in other areas of consumer and industrial demand. Modest success already recorded in lifting sales of perlon for shirtings, women's undergarments and industrial uses, such as belts is a major reason for trade enthusiasm for 1956 operations.

Other Man-Made Fiber Developments—The Berlin firm of Spinnstoffabrik Zehlendorf A.G., which started perlon filament production last year, recently decided to double output in 1956 and start a new unit to turn out perlon staple.

Farbwerke Hoechst A.G., which plans to begin producing "Diolen" under Imperial Chemical Industries' license this summer, will call its fiber "Trevira," Dr. K. Winnacker, managing director, has announced. Hoechst boosted 1955 sales turnover by 143 million DM to 1.27 billion.

DYEING and FINISHING Section



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Polyethylene

(Continued from Page 33)

head to assure best possible homogenization of the melted resin is of importance, as is good control of the temperatures over the length of the barrel and at the head. The melting point increases with the average molecular weight of these polymers from 230°F to level out at a high of approximately 250°F while the already high melt-viscosity continues to increase. Because of these flow characteristics it is an advantage to hold the extrusion temperatures considerably above the melting point, or between 400 and 600°F.[2, 3] This can be done without any deterioration of the polymer.

Orientation

The resin as extruded has its polymeric chains randomly distributed, bent, kinked, curled. In order to obtain high strength fibers the molecular chains have to be oriented, or aligned along the fiber axis. This is done by cooling the extruded rods and drawing them under conditions which depend on the type of polymer, its molecular structure, the length of the molecular chains, and the degree of crystallinity which is influenced also by the conditions of extrusion and quenching. For this type of polyethylene the rods are usually cold drawn, but heat is generated within the filament. An elongation of at least 500% of the original length is necessary to obtain an acceptable degree of orientation (Fig. 1).

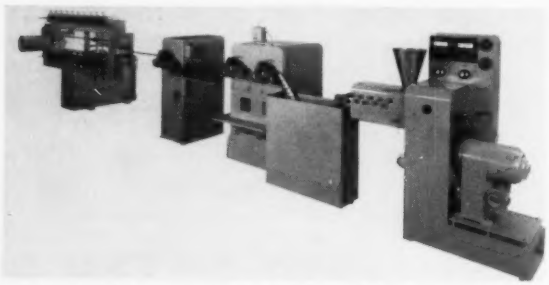

Fig. 1—Assemblage of equipment to produce I.C.I. type monofilaments consisting of (from right to left) melt-extruder, quench bath, cold-drawing, annealing, and spool winder. (Courtesy of Modern Plastic Machinery Corp., Lodi, New Jersey.)

The stress strain curves which illustrate the performance of the filaments in stretching at room temperature are in a measure specific to polyethylene; typical curves are drawn in Fig. 2.

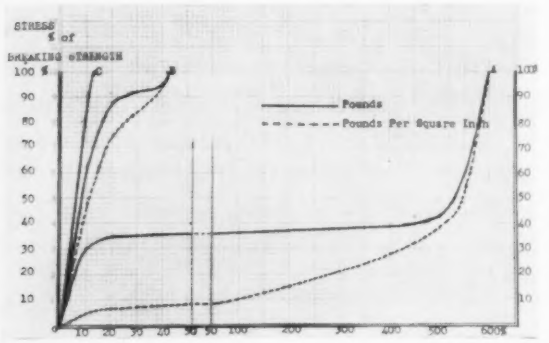

Fig. 2—Stress-Strain Curves (at room temperature) typical for cold-drawn I.C.I.-type filaments.
A—Unoriented rods drawn 600%
B—Oriented filaments, 42% ultimate elongation
C—Oriented filaments, 13% ultimate elongation

The individual form of these curves is subject to wide variations.[1] The breaking strength differs widely with the structure of the polymer, its molecular weight, the stretch ratio, and the speed of drawing, and, of course, with the cross section of the filament. To eliminate these variations and to permit an overall comparison the stress values of these curves were calculated in percentage of the highest strength at which break of the respective filament occurs. Curve A represents one example for the entire drawing operation from the unoriented rods to the final filament. B and C are examples for the behavior of oriented filaments with different degrees of ultimate elongation.

Yield Point and Elastic Limit

Necking of the curves indicates the "Yield Points" which are located within a narrow margin of about 10 and 20% strain, but the stress values at this point differ considerably. This stress is quite low for unoriented filaments as in curve "A," at approximately one-third of the tensile strength at rupture. It is high for oriented filaments, say 90% in example "B" at an ultimate elongation of 40 to 45%. It is close to the breaking strength for highly oriented filaments with low residual elongation as in example "C." The stress at these yield points is a function of the temperature due to the thermoplastic nature of the resins; it decreases as the temperature increases and is about twice as high at room temperature as it is at 175°F.[5]

The straight part of the curves is the region where considerable intermolecular forces oppose the strain. Within these regions the filaments have a high degree of elasticity so that they recover their original length upon relaxation nearly instantly. An apparent "Elastic Limit" has been defined at 5% elongation[6] for the unoriented polymer as in example "A." However, oriented filaments as shown in "B" and "C" remain elastic up to elongations of 10 to 12%. The stresses at these elastic limits, apparently correlated with the stresses at the respective yield points, are subject to similarly wide variations. In the examples of Fig. 2, the limit elastic stresses would range from approximately 20% of the breaking strength in pounds for curve "A" to 65 and 80% for curves "B" and "C." The stress which can be applied to the filaments up to the limits of elasticity is in many instances of greater practical importance than is the tensile strength.

It is conventional to establish stress-strain curves by measuring elongation in percent and break in pounds on the different extensometer instruments (Scott Testers, Instron, etc.). These stress values usually are figured in pounds per square inch, PSI, of the cross section at the beginning of the stretch. The fully drawn curves A, B, C are representative of such measurements. This presentation has its practical value; it is, however, somewhat misleading because the cross section diminishes with increasing elongation, and the actual PSI values increase proportionally more than does the stress based on the initial cross section.

This consideration has little practical bearing when the stress increases considerably for a short elongation, but it profoundly changes the picture for "ductile" materials such as unoriented or not fully oriented polyethylene fibers. In the diagram of Fig. 2 the dotted lines of curves A and B were established with the PSI values on the actual cross sections as they progressively diminish. These values are expressed in percent of actual PSI based on the cross section

at the point of rupture. It is here assumed that the volume of the stretching material remains unchanged.[4] This is not strictly correct because the density has a tendency to increase somewhat in the course of the orientation, perhaps due to greater crystallization. But such contraction would not exceed approximately 1%.

Thus presented, the horizontal phase of the PSI curves disappears and changes to sloped lines. The yield points remain apparent but less pronouncedly and they are located at considerably lower values of relative PSI. The same will be true for the stress at the elastic limit, and this fact should be taken into account, where these values are of critical importance.

Dimensional Stability

The I.C.I. type filaments after being oriented as described above, are dimensional unstable. When subject to higher temperature they retract in length, the more so the longer the duration of the heating effect. For instance when heated over a period of 20 minutes, they may lose:

about 5%	at 110°F
15 to 25%	at 165°F
60% up	at 212°F

Concurrently, the ultimate elongation increases in relation to the degree of shrinkage. This tendency to shrink can be reduced by holding the oriented filaments at a temperature of between 30 and 50°F below the melting point while preventing retraction, over a period of time from a few seconds to several minutes depending on the filament diameter. Such annealing procedure relieves internal stresses and changes the crystallization. Further improvements can be obtained by preshrinking the filaments more or less but under controlled conditions.[6, 7] For many end uses it is sufficient to make the filaments practically stable up to 140°F, and to reduce the shrinkage at 165°F to around 5%.

Sizes and Strength of Oriented filaments, I.C.I. type

Round filaments popular in U.S. are listed on Table I, shown immediately below.

latter with controlled shrinkage properties. Indicated are also the PSI based on the "as is" diameters of the filaments and the corresponding figures of PSI based on the reduced cross section after elongation to the point of rupture.

The tenacities in grams per denier of the two types of polyethylene monofilaments vary between 1.3 and 2.3 when calculated on the diameter of the filament "as is" and from 1.9 to 3.0 when this figure is related to the reduced cross-section at rupture. The Reevon brand of filaments has higher strength but somewhat lower elongation, the changes being due to selection of polymers and improvements in processing the filament. Courtaulds Ltd. lists for their filaments a tenacity of between 1.0 and 1.5 grams per denier with 25 to 50% extensibility.

The indications for ultimate elongations are average figures which are subject to variations. By controlling the conditions of drawing, these extensibilities can be reduced or increased.

Finer filaments down to the polyethylene denier range of 40 or less are produced as multifilaments in bundles or tow form with between 2 and 40 single filaments per strand. These may be cut to short staple lengths, but spinning such staple into yarns presents difficulties. A method of producing superfine thermoplastic fibers by melt extrusion into a hot air stream has been developed at the Naval Research Laboratory, and fibers of diameters of .001" or less are collected in form of webs or sheets.[8]

Filaments having other than round cross sections, for example flattened, are available in a variety of sizes and can be produced either in clear material or colored by incorporating selected pigments.

Effects of Sunlight and Outdoor Exposure

One factor which hampered the development is the sensitivity of polyethylene to sunlight and outdoor exposure, a fact common in greater or lesser degree to most polymers, synthetic as well as natural.

One of the first practical applications of polyethylene had been in protective sheaths and jackets for wire and cables where resistance to outdoor exposure is of prime importance. The Bell Telephone Laboratories started as early as 1939 a long range

Table I
Characteristics of Commercial Monofilaments (I.C.I. Type)

Diameter Inches	Single Strand Break Lbs.		Ultimate Elongation %		PSI "As Is"		PSI* "At Rupture"	
	Regular	Reevon	Regular	Reevon	Regular	Reevon	Regular	Reevon
.008	—	1.4	—	50	—	25,000	—	37,000
.010	—	2.2	—	30	—	27,000	—	36,000
.012	1.8	3.2	50	25	15,500	27,000	23,000	35,000
.015	2.8	5.0	45	25	15,000	27,000	22,000	34,000
.020	4.9	8.3	45	25	15,000	26,000	22,000	33,000
.023	—	11.0	—	25	—	26,000	—	33,000
.030	—	19.0	—	25	—	26,000	—	33,000

* PSI "at rupture" = $\frac{\text{PSI "as is"} \times (100 + \text{ultimate elongation})}{100}$

In each case the single strand break in pounds and the ultimate or residual elongation are given for "regular" and for special "Reevon"* filaments, the program. Results of these elaborate experiments both outdoors as in accelerated laboratory exposure were summarized in a report by V. T. Wallder and coworkers in 1950.[10] There was general agreement in the industry that addition of well-dispersed channel

* Trademark, Reeves Brothers, Inc.

type carbon blacks of low particle size gives adequate protection in outdoor weathering for most applications.[11,12]

In applications for woven automobile seatcovers it was found that filaments colored with several non-carbon pigments resisted better than others which fail rapidly as does clear unpigmented material, in line with results of accelerated and outdoor tests on films obtained by the Bell Telephone Laboratories.[13] Heat and infra-red effects could not be blamed, because in such case black should be the first to fail.

Ultraviolet radiation, however, catalyzes the oxidation and is, therefore, at the root of this phenomenon. The exposed surface of the plastic material is subject to destruction progressing as layer after layer turns into powder. Thin films or fibers are therefore particularly prone to failure. Such mechanical breakdown of polyethylene is often correlated with an undesirable change in dielectrical properties (increase of power factor) or with brittleness at low temperature, but in the case of oriented filaments the loss in tensile strength provides a practical indication because the thickness of the healthy core decreases as the destruction of the resin progresses.

For the study of this problem old and new basic research in the rubber field[14] and on oxidative degradation of polyethylene[15-18] and other synthetics such as polystyrene[19] proved useful whereas vinyl and vinylidene (Saran) polymers differ in their chemical pattern of degradation. Elaborate experimentation over a period of several years,[20] led to the conclusion that ultraviolet stabilization of polyethylene filaments can be obtained sufficient for many practical purposes.

Antioxidant agents as well as ultraviolet absorbers prolong the "induction" period and retard the start of degrading oxidation. As far as is known up to now, such effect is a quite limited one for natural, clear filaments unless yellowing and darkening is acceptable upon exposure as a result of such addition.

Pigmentation can provide pronounced protection if selected pigments of low particle size and in sufficient concentration are well dispersed in the resin. They have to be free from oxidizing compounds and from those which tend to catalyze oxidation. Pigments having antioxidant or reducing properties are preferable as are those with high degree of ultraviolet absorption, whereby the blue, green and brown types have usually better resistance than lighter ones. The degrading effect will be more pronounced for filaments of smaller diameters for reasons given above.

Contact with specific organic liquids or surface active agents may cause crazing or cracking,[21,22,23] less pronounced in the case of filaments perhaps because orientation provides uniaxial stress only and hardening of the surface, and also because of the comparatively high molecular weight of the resin used.

Polyisobutylene—Blends

The addition of polyisobutylene has been suggested[24] and filaments can be extruded and drawn from blends with polyisobutylene of molecular weights of 80,000 or higher. Such additions progressively increase flexibility and extensibility, but breaking strength, softening point and dimensional stability are lower, and a tendency to stickiness develops.

The second part of this article, which will appear in the June issue, will deal with the commercial applications and the recent developments in the field.

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Acetylene Chemicals Price Reduction

Antara Chemicals, a sales division of General Aniline & Film Corp., announced reduced prices on acetylene chemicals being produced at the company's commercial plant in Calvert City, Ky. The products are said to be manufactured on a full commercial scale for the first time in the U. S. at Calvert City. According to the company, Polyvinylpyrrolidone has found wide use in cosmetics and pharmaceuticals and has achieved success in various industrial applications including textiles, lithography, photographic chemicals and detergents. Butanediol has found industry acceptance as a basic raw material, particularly in plasticizers and plastics. The company expects that the lower prices will open up many new markets for these chemicals.

Avisco College Aid

American Viscose Corp. has enlarged its College Relations Program to include ten more grants for the academic year 1956-1957. This aid, in the form of fellowships, scholarships, grants-in-aid and assistance to educational foundations, will benefit advanced education. Twenty-two fellowships, given for graduate work, have been established in the fields of chemistry, chemical engineering, pulp technology and accounting. Twenty-three scholarships have been awarded to undergraduates who are majoring in chemistry, physics, engineering, textiles and business administration. Seven grants-in-aid have been established to cover industrial medical research, food technology and textile research.

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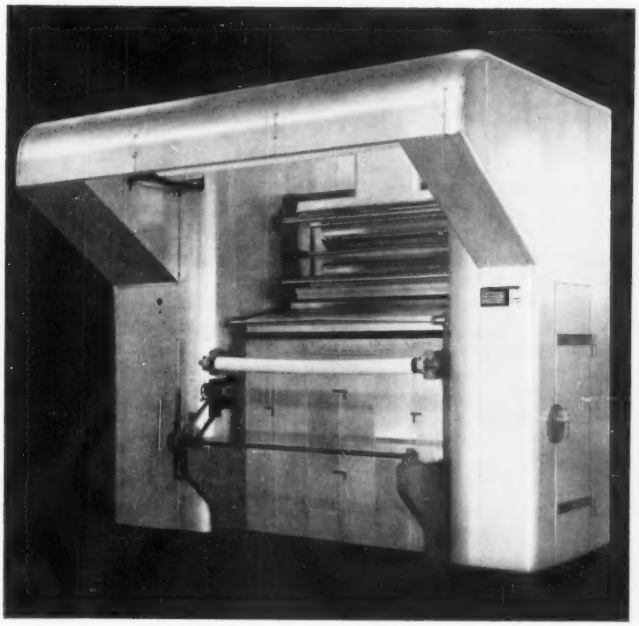

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* * *

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Malcolm

(Continued from Page 32)

and supervised the construction of a jute manufacturing plant at Kearney, N. J., known as the Marshall Mill.

He remained with Linen Thread until 1926, the year he made the big decision to go into business for himself. In association with R. M. Shafer, V. D. Shafer, and C. J. Delone, Malcolm found a mill property in Hanover, Pa., which seemed to suit their needs. The original capital was about $200,000, and Malcolm was assigned the post of general manager since it was upon his skill and experience in jute manufacture that the future of the new company largely depended.

At the outset, Malcolm insisted as a basic condition for his entering the new venture that the best and most-up-to-date machinery for spinning jute be acquired. Years of struggling with worn-out machinery at Chelsea and elsewhere, had bred in him the conviction that if he ever went into business for himself, his plant would be equipped throughout with the best machinery available.

Ordered Best Machinery

And that's the way it was done. Most of the carding and spinning machinery was ordered from Scotland and Northern Ireland from such old-time specialists in jute equipment as Fairbairn and also Mackie. It was the best available at the time. Today, after 29 years, it is still efficient, clean-running, and modern in appearance.

The new spinning company named Revonah (Hanover spelled backwards) started with 40 employees and prospered from the start. Malcolm was well-known in the carpet business as an expert jute spinner and a stickler for high quality. He brought his exacting standards to his new operation and even boosted them higher. The result was that Revonah's jute yarns soon gained a reputation for their high quality at prices that were competitive with those prevailing in the market.

The business grew steadily. By 1943, Revonah's gross sales were about $2,500,000 a year. In 1955, this figure had climbed to $8,000,000, helped greatly by the company's sales of synthetic surface yarns. During the years since 1927, James Malcolm has grown to be perhaps the best-known jute spinner in the United States. Among carpet manufacturers, who have been using his yarns now for decades, he is a well-loved figure, deeply respected for his knowledge of how jute yarns should be used in backing fabrics for soft floor coverings. His skill and experience have been of practical value to many a carpet millman, confronted with a problem in the use of backing yarns.

His Horses Won Many Prizes

As his business prospered, Malcolm found time for his favorite diversion—raising and training prize winning saddle horses. For years he maintained a stable of fine horses, many of which he himself rode expertly. He has a cabinet in his office crammed with cups and ribbons won at scores of horse shows in the United States and Canada.

Still hale and hearty and still very much the head man at Revonah, James Malcolm at 78 can look back on a useful, productive and satisfying life. A man of outspoken mind and strong loyalties, he has practiced all his life his deeply felt business credo that good workmanship and good quality products are what makes a company successful.

As an example of his philosophy of quality first, he cites the case of jute yarns. "You buy raw jute," he says, "for about 14 cents a pound, and you sell the finished yarn at prices ranging from 25 to 28 cents. With such a narrow spread, there is little room for price cutting. In my yarn business, therefore, I have not tried to get business by selling a cent or a half-cent under my competitors. But I have tried constantly to outsmart my competitors by making my yarns better and better."

To his belief in quality he adds a conviction that the surest way to get on in life is through hard work. "When I was a young fellow," he explains, " I looked around me in the business world where I was just getting a toehold. I saw that the men who had fine homes and good cars and money in the bank were the ones who worked hard every day. I also noticed that the men who had little were the ones who worked only when they were forced to, and who were experts in ducking work and responsibility. So I resolved to work hard so that I could get the good things in life that I wanted. Today I can say that my hard work was rewarded far more richly than I ever expected."

Outlook (Continued from Page 30)

Consumption Cycles—The textile industry has been typically cyclical, with pronounced and fairly regular ups and downs. This has reflected a condition of ample, or more than ample, capacity. Much progress has been made in stepping up the efficiency of production. Given a favorable margin on a specific fabric, a number of looms will find their way quickly to that construction. Within a few months, supply levels exceed current demand, and a period of inventory liquidation becomes necessary.

There are some indications that a peak in one of these fiber consumption cycles was reached last year. The new Minimum Wage Law encouraged advance buying of staple fabrics and finished products, and maintained output late in 1955 and during the first quarter. Recently, however, many mills have announced some curtailment in output. A declining trend of consumption seems to be under way which, if the timing of earlier cycles is repeated, should reach its most critical point some time this summer.

Lessons for the Future—Certain conclusions seem to be justified. One is that textile and apparel research expenditures, which have been greatest at basic levels of the industry, have paid off in terms of rising per capita consumption of new fibers.

A corollary conclusion is that the industry as a whole would probably be better off in its competition with manufacturers of automobiles and other consumers' goods if all levels of the industry had spent more money on research and development. It can also be estimated that expenditures for economic or merchandising research have been even lower than expenditures for physical and chemical research. If such spending had increased proportionately to expenditures by fiber producers on advertising and promotion, overall results should have been better.

With regard to nearby economic trends, some decline in textile fiber consumption seems to be underway. Such periods have been utilized in the past to test and improve new products, or to modify old ones; the companies that have done best are those who have new or modified products ready when the upward phase of a new cycle begins.

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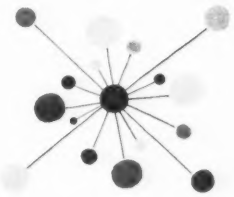
JETSPUN rayon, provides the home furnishings trade with a wide range of colors designed by Howard Ketcham, famed color stylist.



JETSPUN rayon, is colorfast to light, laundering, perspiration, crocking, dry cleaning, chlorine bleach, peroxide bleach and gas fading.

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Nylon gaining in carpet use

As a carpet fiber, nylon currently is making impressive gains, according to a recent study by the Du Pont Co. Considered only from the standpoint of the number of manufacturers of 100% nylon carpeting, styles available, and yardage increases, 1955 would have been an important year for nylon. But price reductions which occurred at the end of last year made 1955 doubly significant in nylon's rapid penetration of the floor covering market.

Reaction to the price reduction in nylon carpet staple from $1.50 to $1.20 per pound was felt rapidly throughout the industry. The first impact was in the tufting industry, where further production expansion in this already active segment was soon shown. For example, three mills took advantage of the price changes to accelerate their programs on heat-set twist yarns in friezes and nubby textured carpets scheduled for introduction at the 1956 January market in Chicago. Throughout the woven carpet industry, mills followed rapidly with revaluation of existing programs.

While price reductions were the most important single event of the year for nylon carpeting, their impact must not be allowed to obscure the progress registered even before price changes were announced. More than 15 manufacturers were marketing 20 carpet styles of 100 per cent nylon. Total yardage for this floor covering had doubled during the year under the old price structure.

Since nylon staple was selling at a considerable premium over wool carpet fibers, an analysis of factors underlying this progress becomes important in predicting what may be expected as a result of the price decrease. For the mill, the low specific gravity of nylon means that, in comparable constructions, nylon has generally 15 to 35% greater covering power than other popular carpet fibers, on a pound for pound basis, the Du Pont report points out. In addition, easier processing of nylon, and lower processing waste provide economic advantages over natural fibers. Nylon is readily dyed in a full range of bright clear colors. It can be heat-set into a lasting twist, which will not yield to age, wear, or scrubbing. Being a man-made fiber, it is received clean and uniform, and is not subject to the vagaries in price or quality resulting from climatic factors or size of seasonal yields.

Consumers appear to be satisfied with nylon carpets. In a recent Du Pont survey, consumers, polled one year after their carpet purchases, reported 83 per cent strong that their carpets looked as good as at the time of purchase. Favorable experiences in removing stains and spots were reported by 87 per cent.

In recent tests conducted by the National Institute of Rug Cleaning, it was shown that nylon carpets could be cleaned successfully by any existing procedures used in cleaning wool carpeting, and with superior results obtainable through slight modifications in cleaning techniques. Texture retention after severe brushing or passage through squeeze rolls was superior in nylon carpeting to all other carpet fibers tested. Results reported in the Institute's Technical Rug Cleaning Bulletin on spot removal tests stated:

"In general, nylon pile carpeting responded to the techniques and chemicals such as can be used safely for treating wool pile fabrics and with more favorable results in most instances. Nylon can be worked more vigorously than wool without fear of permanent texture change."

What has already been accomplished with regard to nylon carpeting has been in the face of a recognized price differential in comparison with other fibers. The recent reduction, however, brings the cost of nylon yarn per square yard of carpet, after costs of scouring bleaching, spinning, and fiber waste in processing are considered, to a highly competitive position.

The conclusion inherent in these comparisons is backed by the reaction of the carpeting industry, the Du Pont study asserts. Based on information obtained from carpet manufacturers since the price reduction, the future of 100% nylon carpeting can be expected to move in the following directions:

1. Significantly greater yardages in a variety of styles in both woven and tufted carpeting.
2. Price reductions in present lines of carpeting which will place them in higher volume merchandising levels.
3. Probable upgrading of lines at present prices by use of more fiber per square yard to yield carpeting of even greater consumer appeal.

Du Pont Changes

(Continued from Page 37)

Straughn, formerly head of rayon sales; Dacron polyester fiber sales programs, George H. Braniff, formerly manager of technical service section; nylon sales programs, James O. Graves, formerly assistant manager, advertising and promotion section; Orlon acrylic fiber sales programs, George S. Demme, formerly manager Orlon sales, and new products sales programs, William L. Hyden, formerly manager development section.

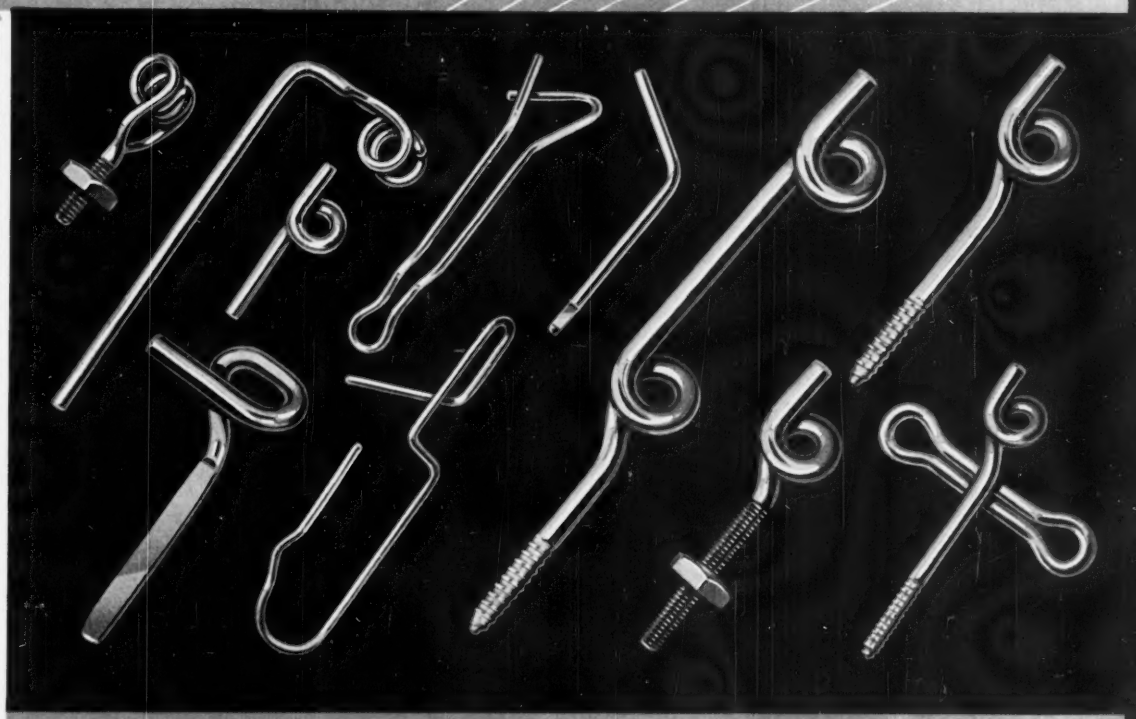
James S. Rumsey, assistant manager of women's wear merchandising section, was named manager of that section, succeeding Mr. Trapnell.

Charles E. Mears, formerly manager of nylon sales, was named manager of the industrial merchandising section, a position which has been unfilled since the appointment of Russell W. Peterson to director of Textile and Industrial Products Research Division several months ago. Otto J. Lutness, assistant manager of the technical section, was named manager, succeeding Mr. Braniff.

Avisco's Cellulose Section

The cellulose section of American Viscose Corp.'s research department at Marcus Hook, Pa., has been reactivated. Dr. Wayne A. Sisson has been named leader of the section, responsible for studies aimed at setting up basic principles of cellulose structure and behavior, and relating these to present and future products. Five other appointments to the section include: Dr. Bengt G. Ranby, Dr. Robert H. Marchessault, Dr. Leland B. Ticknor, Dr. James Russell, and Edward Hicks.

Engineering Section



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MITCHELL-BISSELL CO.

Fast new winder cuts quilling costs

New Foster-Muschamp unit is fully automatic, operates at 15,000 rpm

STAFF PREPARED

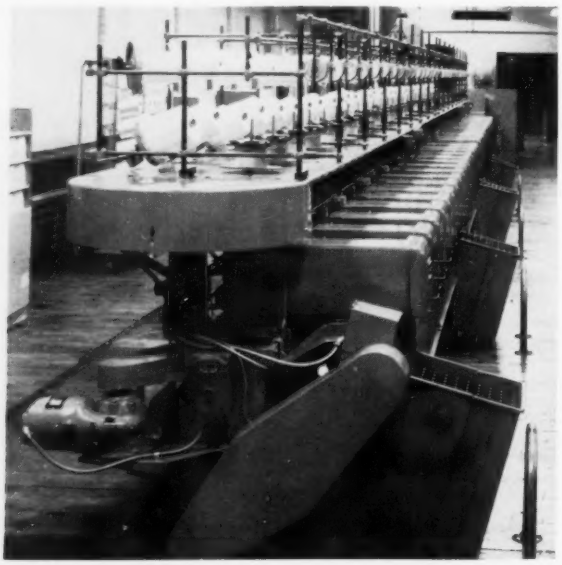
REDUCTIONS in overall winding costs by one-third over best existing equipment were claimed for the new Foster-Muschamp Model 66 automatic filling winder at a demonstration at the plant of William Skinner & Sons in Holyoke, Mass. last month.

Said to be the first fully automatic and the highest speed quill winder developed in the United States—spindle speed is 15,000 r.p.m.—the new machine is on the eve of commercial production, according to W. C. Chisholm, president of Foster Machine Co., makers of the new winder.

In addition to the initial installation at Skinner's which has been in operation about a year, other machines are in use in a number of mills including Burlington's Cascade Mill at Mooresville, N. C.; Stonecutter Mills, Spindale, N. C.; the mill of Stern& Stern, Hornell, N. Y.; the J. P. Stevens mill and the Dover Mill of Shelby, N. C.

Along with high speed and fully automatic operation, other advantages of the new Model 66, stressed by Mr. Chisholm are:

Flexibility—The winder can be used effectively to wind any type of yarn including woolen, worsted, Dacron, nylon, glass as well as cotton, rayon and acetate. All sizes of bobbins can be accommodated up to nine inches. Both pin boards and bobbin boxes can be used to receive wound bobbins.



Here is the new high speed, fully automatic filling winder of Foster Machine Co. as seen from the foot end

Simplicity—Any experienced mill fixer with a reasonable amount of training, Mr. Chisholm said, can make all necessary adjustments. An engineer is not needed to run the machine.

Elimination of starting tail—A device traps the yarn alongside the driver during the transfer cycle. The end is released during the first few revolutions when the bobbin commences to wind. The end is thus buried in the first few wraps of the bunch. The machine also makes perfectly wound bunches of predetermined length.

Bobbins wound by the Model 66 are said to have a maximum yardage of constant density thus insuring high quality results in weaving.

Use of the Model 66 winder, according to P. H. Farmer, Foster's assistant sales manager, can reduce filling defects by at least one percent. On cotton, he said, filling defects can be reduced by 2 to 3 percent. In test weavings of fabrics with filling yarns quilled by the new high-speed winder, it has been proven that the machine produces superior cloth, Mr. Farmer stated. The test weavings were carried out over a period of months at the Textile Research Department of American Viscose Corp., at Marcus Hook, Pa.

Operation of the Model 66 winder is fully automatic, including pinboarding of bobbins. Tasks of the tender are confined to replenishing supply cones and piecing up occasional broken ends. According to Mr. Farmer, one spindle on the new winder will service 5 looms, while a unit of 32 spindles in mill trials has demonstrated its ability to service 150 looms. Cost of the Model 66 is estimated to be about $20,000 for a unit of 32 spindles.

An advance model of the winder was shown at Atlantic City in April, 1954 at the American Textile Machinery Exhibition. Since then it has been greatly improved by two years of intensive development work and mill trials, according to Mr. Chisholm. Made entirely at Foster's plant at Westfield, Mass., the machine is the result of collaboration between Foster and Muschamp Textile Machinery, Ltd. of England.

At the demonstration last month, figures were released by Foster showing Skinner's production experience with the Model 66 winder. It was stated that allowances are easy to establish because each spindle of the Model 66 operates independently except for the drive.

It is thus possible, according to Foster, to determine a cycle of operations regardless of the fact that several different counts and colors may be running on the same machine at the same time. Foster points out, however, that for overall cost comparisons it is necessary to compare identical data on preceding and subsequent operations as well as on the winding operations.

Specifications and Operator Duties
Actual Time
Wm. Skinner & Sons

Foster-Muschamp Model 66, Spindle Speed 15,000 RPM
Yarn 100/45/5T Bemberg

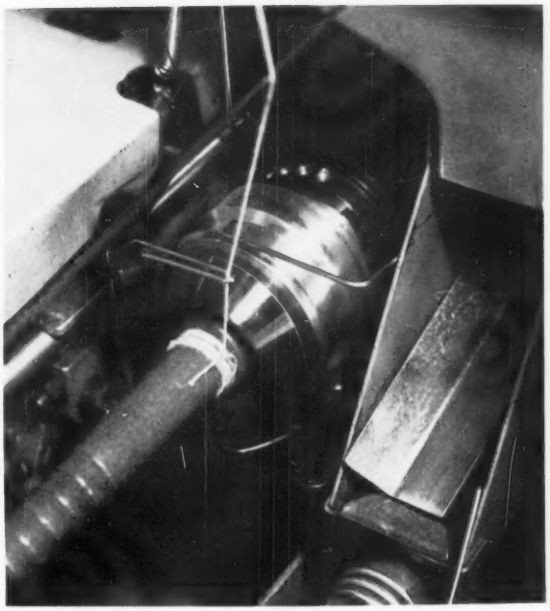
SPECIFICATIONS

1.	Lbs. per quill	.07
2.	Lbs. per cone	3.8
3.	Quills per cone	54
4.	Yards per quill	3125
5.	Winding time per quill including transfer (Mins.)	3.565
6.	Lbs. per spindle hour 100%	1.176
7.	Quills per spindle hour 100%	16.83
8.	Lbs. per spindle week (40 hours)	47.04
9.	End breaks per quill	.01
	Tender Service Time in Minutes	
10.	Unwrap cones and place on creel deck	.12
11.	Repair breaks	.12
12.	Creel in supply	.28
13.	Magazine pinboards	.08
	Lost Machine Time per Spindle Hour in Minutes	
14.	Average wait for end break service 3.54	
15.	Fixing Time .125	
16.	Cleaning time .0625	
17.	Total 3.7275	
18.	Machine Eff. (60 — line 17 ÷ 60 =)	93.8%
	Machine Time Per Quill in Minutes	
19.	Winding time	3.465
20.	Transfer time	.10
21.	Service end breaks (line 9 × line 11)	.0012
22.	Wait for end break service (line 9 × line 14)	.03465
23.	Fixing time (line 15 ÷ line 7)	.007
24.	Cleaning time (line 16 ÷ line 7)	.003
25.	Total	3.61085
26.	Net quills per spindle hour	16.61
	Attendance Time per Spindle Hour in Minutes	
27.	Service end breaks (line 26 × line 21)	.0199
28.	Creeling (line 26 × line 12 ÷ line 3)	.086
29.	Unwrap cones (line 26 × line 10 ÷ line 3)	.037
30.	Magazine pinboards (line 26 × line 13 ÷ 80)	.0166
31.	Cleaning Time (line 16)	.0625
32.	Total	.2220
33.	Personal, idle and off job 15%	9
34.	Proposed spindle assignment (51 ÷ line 32)	231
	Weekly Production—40 hours	
35.	Quills per spindle (line 26 × 40)	664.40
36.	Lbs. per spindle (line 1 × line 35)	46.50
37.	Lbs. per tender (line 36 × line 34)	10,741.50
38.	Tender Rate—40 hours	$48.00
39.	Cost per lbs. (line 38 ÷ line 37)	$0.00446

The primary duty of an operator on the Model 66 is to creel in the supply. Her task is therefore confined to the number of supply packages she must handle in any given cycle, less allowances for interference (personal time, yarn breaks, cleaning, fatigue, etc.). All these factors can be projected in a predetermined cycle with the exception of yarn breaks which occur at random. With a little study, however, normal frequency of yarn breaks can be determined and a factor can be established for this condition, Mr. Farmer said.

The time units given in the following table were established by actual observations at Skinner & Sons, and the figures confirmed by the ability of an average operator to meet the task assigned.

In summary, the foregoing figures show that the tender creeled in a 3.8 lbs. cone in .28 minutes and

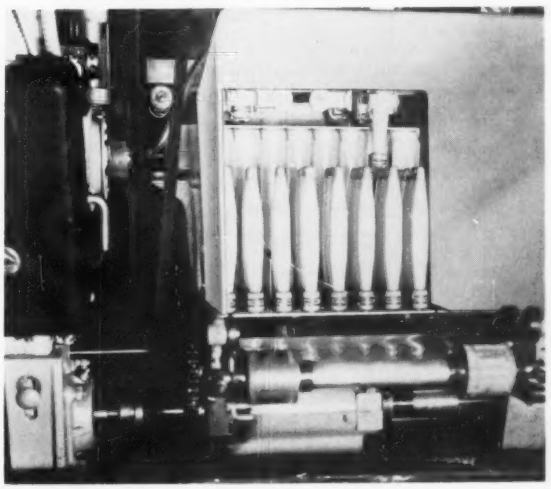


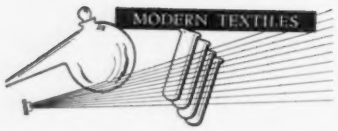
Starting tails are eliminated with the new quill winder. The picture above shows how the tail is released and secured so as to be buried under the first few wraps of the bunch

tied in 1% breakbacks in .12 minutes each. Cleaning, other duties and personal time accounted for 9.0876 more minutes, adding up to a total service time of 9.1161 minutes per spindle hour. Based on the above duties an operator would in 40 hours handle 2827 supply packages, tend 231 spindles at 93% efficiency, and produce 10,741 lbs of 100 denier Bemberg per 40 hour shift. The current wage rate per 40 hours, divided by the pounds produced, gives a cost per lbs. of yarn quilled of $0.00446.

Mr. Chisholm said that Foster will, on request to its Westfield, Mass. offices, survey an individual mill's specific requirements, to project accurately the cost per pound of yarn quilled on the Foster-Muschamp Model 66 for that particular mill.

This closeup of the rear of the new Foster-Muschamp Model 66 Quill Winder shows how the machine automatically drops filled bobbins on a pinboard





Report from JAPAN

By B. Mori

Government Weakening on Rayon Curtailment—Some time ago the Japanese Government, acting through its Ministry of International Trade, advised producers of rayon staple to slow down their expansion of capacity. Although MITI had no power to order curtailment, it was felt that it could bring about this result by using its influence to cut off credit lines of yarn producers who did not obey MITI's "advice" not to expand output.

But now it seems that the Ministry of International Trade spoke too soon with undue pessimism. Undergoing a change of mind, MITI is now reported willing to wait until the first six months of the year have gone by to see whether domestic demand and exports keep up at a level which will justify plant expansion. Then the Government representatives and the industry will get together to re-evaluate the situation.

This attitude seems to justify the opposition of many industrialists, who believe that they are in a better position to gauge their market potential than a Government official; and that, being responsible for management of their companies, there should be no question of their ability to decide whether additional investment in plant is warranted. It is obvious, too, that MITI's unduly pessimistic outlook at the start of this year had some adverse effect on sentiment in the domestic market and on customers abroad.

And Now, Optimism—Hard on the heels of its backtracking on the curtailment issue, MITI issued its formal predictions of textile exports for 1956, painting a rosy picture for the rayon industry, especially in the spun rayon section.

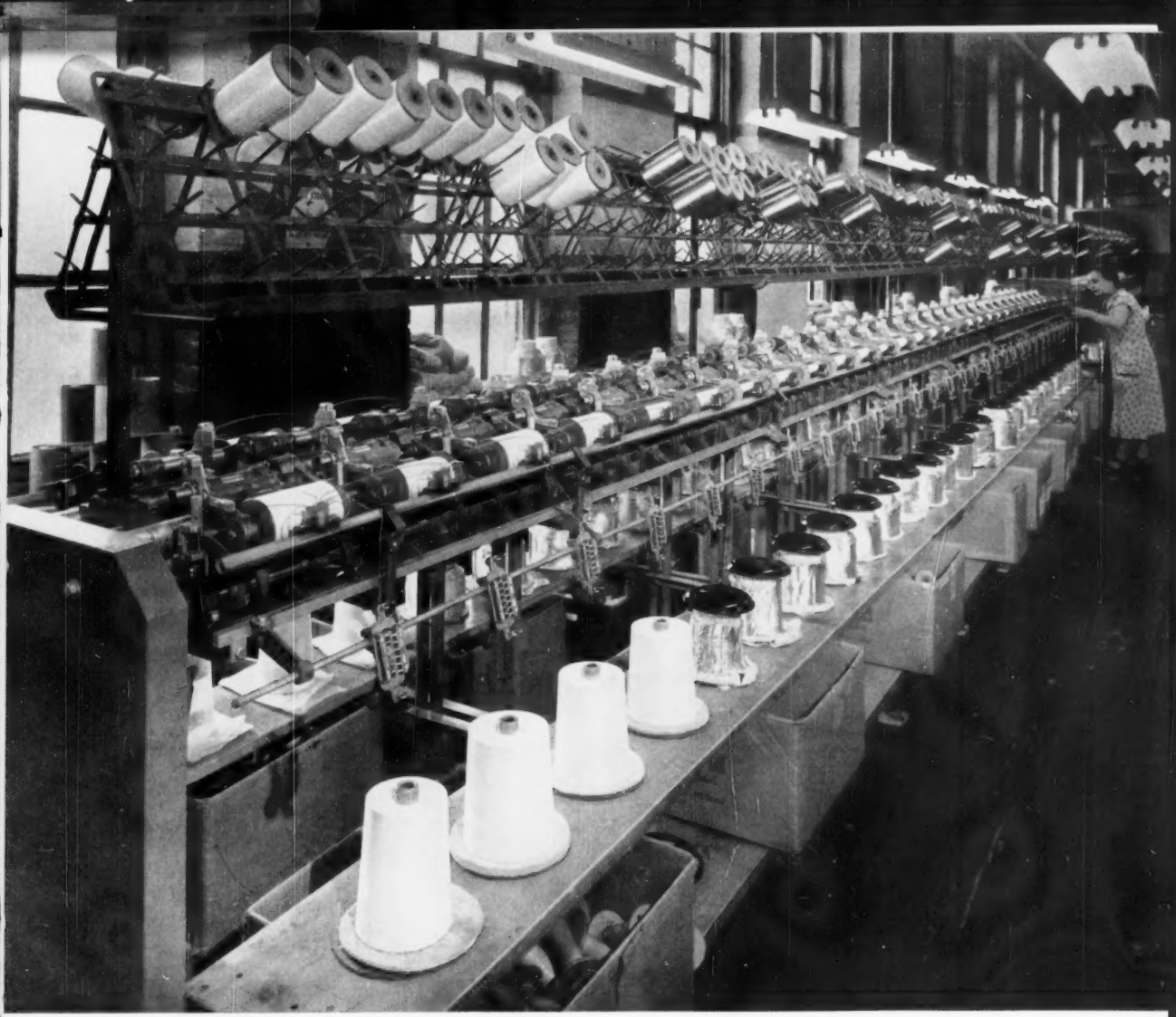
They believe that exports of spun rayon yarn will rise from 39,200,000 pounds in 1955 to 51,800,000 pounds in 1956; spun rayon fabrics, from 521,600,000 square yards in 1955 to 645,600,000 in 1956; filament rayon yarn, from 18,100,000 pounds to 22,600,000; filament rayon fabrics from 337,100,000 square yards to 375,300,000 square yards.

The predictions for cotton goods are: 30,200,000 pounds of yarn and 1,191,000,000 square yards of cloth in 1956, against 26,200,000 pounds and 1,137,000,000 yards in 1955.

Silk at Support Level—Considerable attention from weavers all over the world has been focused on the raw silk market here, which has been rather stagnant recently at or close to Government support price level of 190,000 yen a bale, which is equal to about $4.07 a pound, f.o.b. basis. The Government proved ineffective in restraining the market when, some time ago, it reached and passed through the ceiling price level. So everyone is anxious to see whether the Government can hold the floor price. By purchasing in the open market, the Government, and a private custody corporation formed by the reelers, have exercised a steadying influence.

The big test will come when and if the presently allotted purchasing funds approach exhaustion. Government officials have pledged that the present floor and ceiling prices will be retained for the silk year which starts June 1, and they have pledged that more funds will be provided if necessary to hold the 190,000 yen line. Many users of silk, particularly in Europe, are skeptical and are waiting to be shown whether Japan's words are worth anything. They remember sharply the sugar-link plan and other schemes which disrupted prices and normal marketing in recent years. Now that silk is more widely used, especially in blends with natural and man-made fibers, everyone concerned realizes that the speculation which has always plagued silk users must be eliminated or minimized, if American consumption of silk is to expand steadily on the basis of these wider end-uses.

Meanwhile, Japanese weavers of silk fabrics have started what may be a concerted campaign to seek lower American tariffs on silk fabrics. It was stated to a visiting U. S. Government trade mission that Japanese woven goods are non-competitive with American fabrics—a statement which is obviously incorrect, and may engender some resentment.



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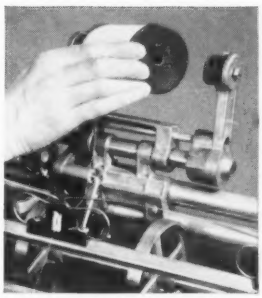

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Blending & Fabric Performance

DACRON - ORLON
ORLON - RAYON

Part 2

By James F. Sayre

Blends of Dacron with Orlon

Blends of Dacron polyester fiber with Orlon acrylic fiber result in a combination of properties that are "made to order" for summer garments. The fabrics are light weight and at the same time have good covering power and texture. Complete launderability as well as wash and wear performance are characteristic of this blend. A blend of 50% Dacron and 50% Orlon gives an excellent combination of fabric properties.

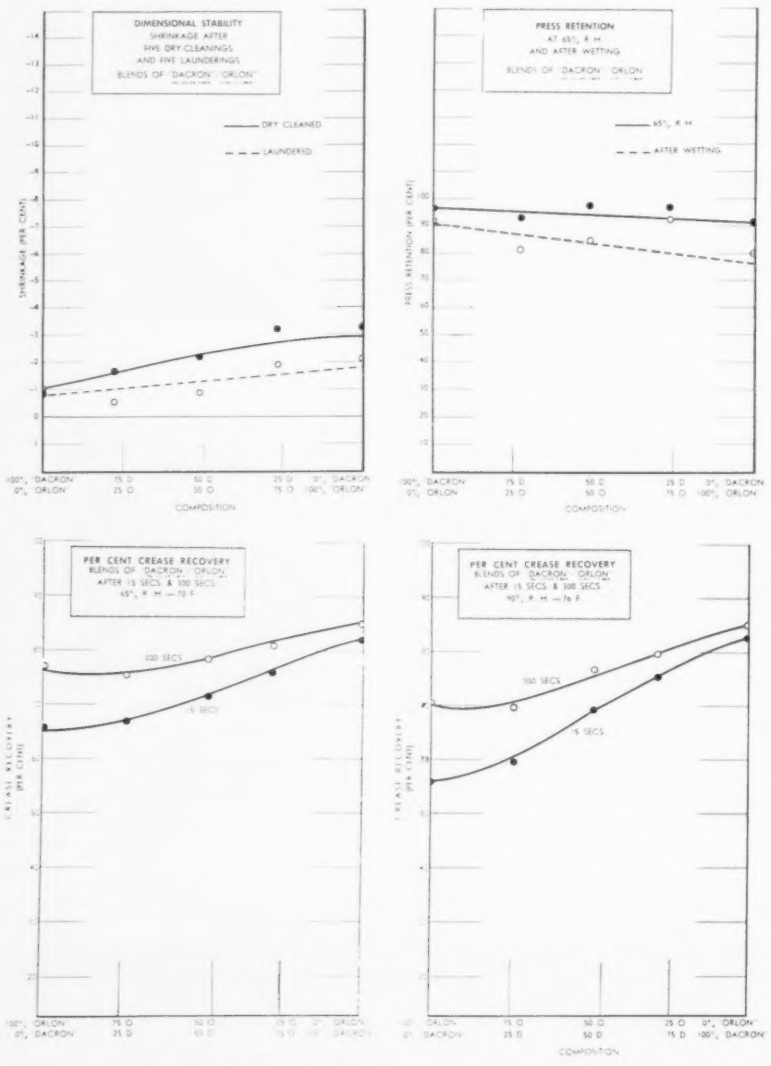
Wash-and-wear is by now becoming a well-known concept in fabric and garment design. Wash-and-wear garments can be worn with a minimum of mussing, washed, hung up to drip dry and worn again, and seldom require pressing. Dimensional stability to laundering, press retention, wrinkle resistance, and crease recovery are the fabric properties most directly related to wash-and-wear. As can be seen from Fig. 1 through 4, high atmospheric moisture or wetting has very little effect on these properties for any of the blend levels.

Abrasion resistance is probably the most important single factor in fabric durability. Fig. 5 shows that the high abrasion resistance of Dacron begins to take significant effect in the blend with Orlon when the Dacron content reaches at least 50%.

Tensile strength and tear strength measurements shown in Fig. 6 and 7 show the contributions of Dacron to the greater durability of the fabric.

Orlon makes an important contribution to the blend by raising the initial damage temperature from cigarette ash above the critical level of 375°F. Fig. 8 illustrates hole melting characteristics as a function of blend composition.

The aesthetic character of a fabric as observed by the consumer is an integrated concept that incorporates many properties of the fiber, yarn and fabric. All aesthetic characteristics are not readily measurable by known laboratory means. However, tests have been devised to measure a few of the contributing fabric properties. Four of these are fabric bulk (specific volume), liveliness, bending length and flexural rigidity. Of the four properties, Orlon provides major contributions to the bulk of the fabric. This makes possible summer suits that are light in weight yet high in covering power and full bodied in hand.



Figs. 1-4

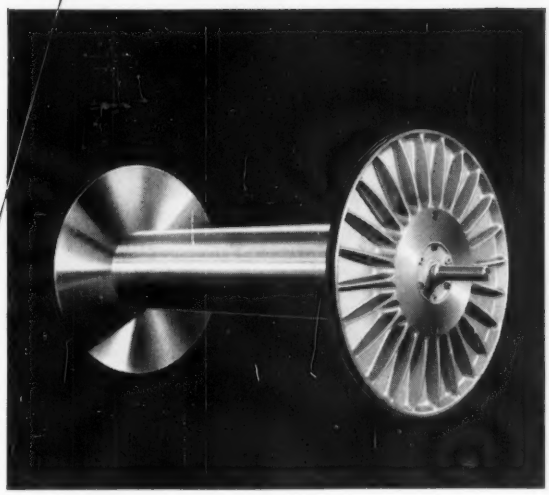
Blends of Orlon With Rayon

Blended with rayon, Orlon improves the texture and loft of the fabrics and provides dimensional stability and press retention. Rayon in the blend gives protection from static. Based on the contributions of each fiber, the best blends in the type of fabrics studied contain approximately 75% Orlon and 25% rayon.

Fabrics from this blend have good aesthetic properties, excellent launderability and good durability. These

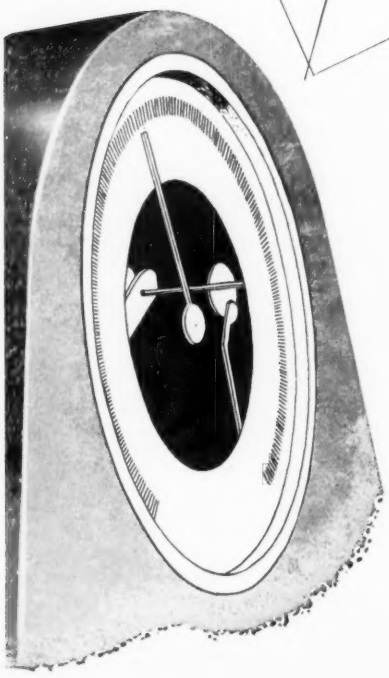
(Continued on Page 62)

Beaming Nylon?



severe test

proves strength of new HAYES *aluminum nylon beam*



During load tests on a million-pound testing machine this Hayes Aluminum Nylon Beam withstood a load of 263,000 pounds without failure. With continued loading, the head casting cracked, — even then the beam still held a load of 80,000 pounds, which is considered sufficient for removal of nylon yarn without loss of material. There was no failure of the threads holding head to barrel. Thousands of these beams are now in use for beaming nylon.

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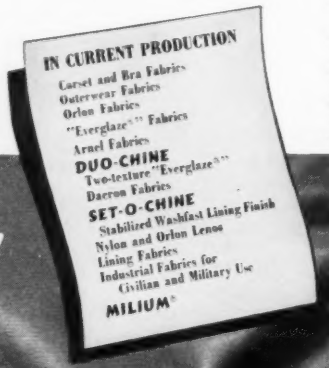

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NEW FABRICS

NEW YARNS

Arnel Jersey Uniforms

Jersey of Celanese Arnel triacetate is now being introduced to the uniform trade by Uniformly Yours of Baltimore, Md. The firm announced that sales promotional mailers on the new uniforms will be sent to over 1000 stores throughout the country. All merchandise will carry Arnel ease-of-care tags.

Arnel triacetate jersey is said to be exceptionally cool and comfortable to wear and is opaque. According to the company, a uniform of this fabric can be hand-washed and drip-dried, requiring little pressing. Special attention has been given to construction and styling of the uniforms, which have such features as reinforced waistbands, and diaphragm construction when styling requires it.

Nylon Yarn on Beams for Tricot Knitters

Commercial availability of 40 denier nylon yarn on beams for tricot knitters was announced by Du Pont's Textile Fibers Department. Both dull and semi-dull yarns are being made available as beamed production. Tricot beams of 15 denier nylon yarn also will be available shortly. Prices for yarn on beams are 10¢ per pound for 40 denier and 15¢ per pound for 15 denier above list prices for yarn on conventional bobbin packages. According to the company, the use of the tricot beams cuts down on the possibility of yarn damage by decreasing the yarn handling operation normally employed.

Orlon Filtration Felt

By packing the interstices of a special Orlon acrylic fiber woven fabric with short fibers of Orlon, Filtration Engineers Inc., have developed a new felt with many interesting applications in wet and dry filtration. The new Feon filter felt combines high chemical and temperature resistance with high bursting strength plus the fine filtering characteristics of a felt. Cost is approximately that of a wool felt. Principal applications will be in filter presses and dust collectors.

Combination Yarn

Metlon Corp. is now offering a combination of Metlon and Jetspun viscose yarn. The two yarns together are said to create a shantung or slub effect by running the Metlon parallel to the Jetspun with a fine binder. By piece dyeing a combination of Metlon with Mylar, Jetspun and any other fiber, a tweed effect is obtained at a minimum cost because of the resistance to dye of Metlon with Mylar.

According to the company, Metlon with Mylar has certified washability, and is fast to light, perspiration, crocking, and gas fading.

Tow-Dyed Orlon Tweeds

Tow-dyed Orlon acrylic fiber in bulky yarns is being used for the first time in woven coatings. Tweeds of Orlon, color-flecked and textured, are made in basket weave and homespun effects. Sportleigh-Hall is tailoring these fabrics of 100 per cent Orlon into coats that are said to be lightweight and comfortable to wear.

The bulkiness of the fabric is said to be achieved by dyeing the fiber in tow form, before it is spun into yarn. The coats are said to have good shape retention, wrinkle recovery and to be mothproof. The tweeds are available in 28-inch toppers and full length coats, selling at about $40 and $60 respectively.

TDI warns Congress that trade agreements endanger U. S. textiles

Great harm will be done to all segments of American textile manufacturing if the United States becomes a member of the Organization for Trade Cooperation, Walter Ross, president of Textile Distributors Institute, stated in a recent telegram to Congress.

In his wire, Mr. Ross placed the Institute squarely in support of the views in opposition of OTC expressed by J. Spencer Love, Burlington Industries, Inc., and Roger Milliken, Deering, Milliken & Co., on behalf of the National Council of Textile Industries. Mr. Love and Mr. Milliken spoke at a hearing of the House Ways and Means Committee opposing enactment of H.R. 5550.

In his testimony, Mr. Love said that the textile manufacturers of this country are opposed to United States' membership in the proposed Organization for Trade Cooperation because it would constitute a continuation of the trade policies of the General Agreement on Tariffs and Trade (GATT). This policy, he said, has already done much damage to the American textile industry and threatens to do much more.

Mr. Ross in his wire to Congressman Jere Cooper, chairman of the House Ways and Means Committee, said that TDI believed the bill would allow the "breakdown of protective measures to American Industry" and that the textile industry could not withstand such a breakdown which would provide "further advantages to foreign producers and greater obstacles to American industry and labor."

Mr. Ross further stated that TDI represented leading man-made fiber distributors of the country doing an annual volume of approximately $800,000,000 worth of business annually.

Golf Tournament Plans Completed

The annual golf tournament of the Textile Distributors Institute will be held again this year at Shawnee Inn, Shawnee-on-Delaware, Pa. The tournament will begin on Wednesday morning, June 13 and will end on Friday, June 15 after lunch, according to an announcement by Samuel Schwartz, Cadillac Textiles, Inc., chairman of the Golf Tournament Committee.

Mr. Schwartz stressed that reservations for the tournament will close on May 15, or earlier, if the limited number of accommodations at the inn are filled before May 15. No cancellations will be accepted after June 1. Reservations will be accepted only for the three day party. Each member of TDI is restricted to a total of four reservations including guests. Members may have as guests representatives of mills, yarn firms, brokers, factors, bankers or dyers. Reservations will be accepted in the order received.

While golf is the main attraction at the tournament, there are ample provisions for other sports, including swimming, tennis and archery.

Mr. Schwartz reported that Shawnee Inn management has assured him that the inn has been thoroughly renovated and that all flood damage from last year's floods in the Stroudsburg area has been repaired. He pointed out that the TDI's annual golf tournament has increased in popularity with each passing year, and that next June's event will probably surpass all others in enjoyment.

Other members of the golf tournament committee are George Greenspan, The Cantor-Greenspan Co., Inc.; A. J. Wullschleger, Wullschleger & Co., Inc., and Walter Ross, ex officio, as president of TDI.

Hosiery Tests (Continued from Page 43)

TEST PROCEDURE

a—Clamp one end of the yarn in the fixed clamp, run the other loosely through the movable clamp and hang the 150-200 grain weight on the loose end of the yarn. The movable clamp is then closed which insures that the test will be made under a uniform tension.

b—Hang the 2-3 grain weight on the yarn about 1″ from the fixed clamp.

c—Slide the movable clamp slowly down its rod at a uniform rate of speed until the weight begins to slide down the yarn. Read the distance the clamp has been moved on the vertical rule to the nearest ¼″.

d—Calculate the coefficient of friction by dividing the base distance (20″) into the distance obtained in step c. The resultant is, of course, also the tangent of the angle made by the yarn at the point where sliding started. The results should be reported to the nearest second decimal point. As an example, if the weight had started to slide when the clamp had been moved 8.25″ then the coefficient of friction would be $\frac{8.25}{20} = .41$. (In this connection, it should be noted that in comparing S and Z twisted yarns, as for example in stretch hosiery constructions, one yarn must be placed in the clamps in the reverse direction as the coefficient of friction will differ depending whether the weight slides with or against the direction of twist.)

e—Repeat the test, but first run the yarn through the oil cup or emulsion trough which should be filled with the same oil or emulsion being used on the knitting machine.

The reason for the last step (e) in the test is, of course, to measure the lubricating properties of the oil or emulsion being used and the test is valuable for this purpose in addition to the other reasons previously given.

It has been found that if the coefficient of friction exceeds .45, excessive cutting of machine elements will occur and it is better to not let its value go over .43.

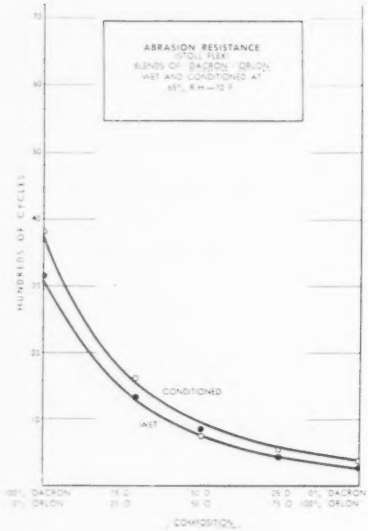


Fig. 5

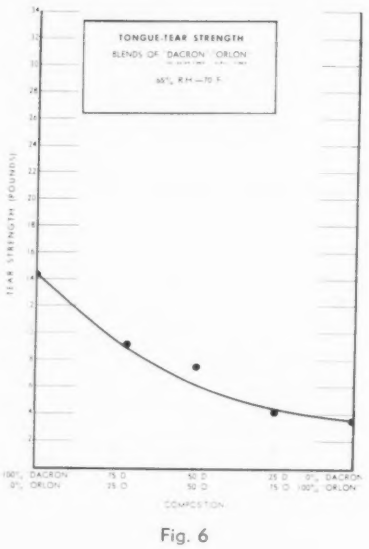
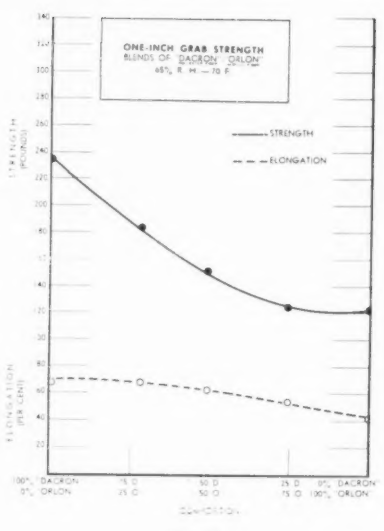


Fig. 6



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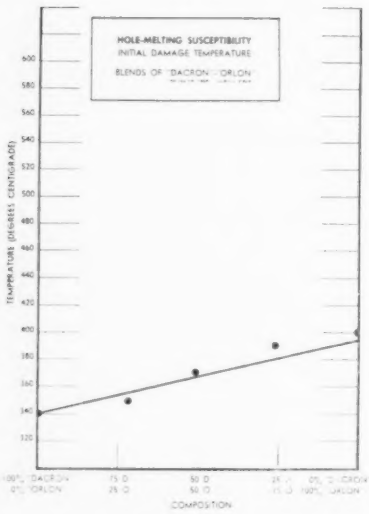


Fig. 8

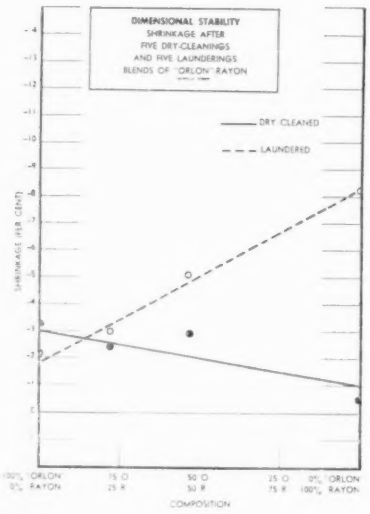


Fig. 9

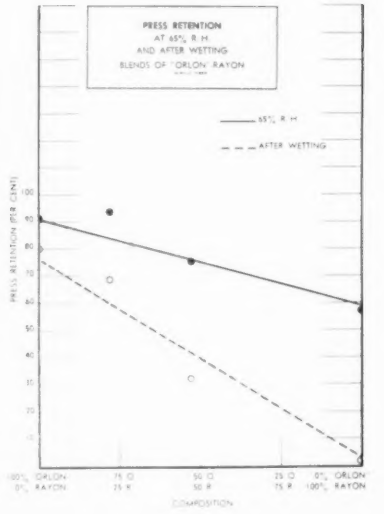


Fig. 10

Blends *(Continued from Page 58)*

features form the basis for the wash-and-wear concept in fabric and garment design.

Crease recovery when wet, press retention, and dimensional stability to laundering are the fabric properties most directly related to wash-and-wear. Excessive shrinkage in either the warp or filling direction of a fabric can have a disastrous effect upon a garment made from it. Fig. 9 shows that up to 25% rayon can be added to the blend with little or no fabric shrinkage.

Press retention is apparently related directly to blend composition. Orlon acrylic fiber is outstanding in press retention because it is hydrophobic and not affected by moisture. Rayon being hydrophilic absorbs moisture readily and has little ability to retain its press when wet or in damp weather. Twenty-five percent rayon in the blend causes a slight loss in press retention, but experience has shown that this loss is not sufficient to seriously penalize wash-and-wear characteristics.

As illustrated in Figs. 11 and 12, crease recovery is not directly proportional to the Orlon content. At elevated humidities, the influence of the rayon is more prominent; but even under these conditions, excellent performance can be expected with up to 25% rayon in the blend.

Abrasion resistance, tear strength and tensile strength measurements show little difference in these three properties for any of the blends of Orlon and rayon.

The fabrics are sensitive in varying degrees to damage from tobacco embers. Fig. 13 illustrates the hole melting characteristics of blends of Orlon and rayon. Experience has shown that fabrics such as the eight ounce per square yard twills discussed here are quite satisfactory in this respect when the hole melting temperatures are above 375°F.

Recent legislation on the flammability of apparel fabrics has spotlighted this aspect of performance. There is little difference in the burning rates of fabrics of 100% Orlon, 100% rayon, or blends of the two. All of these blends fall within a range in burning time

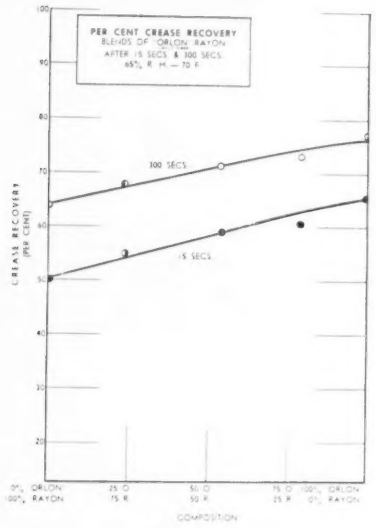


Fig. 11

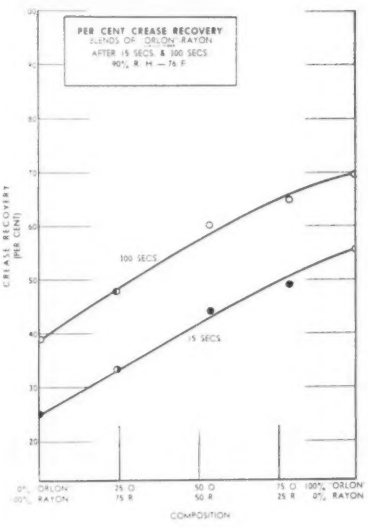


Fig. 12

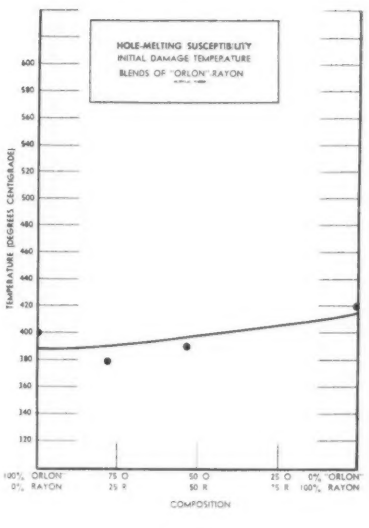


Fig. 13

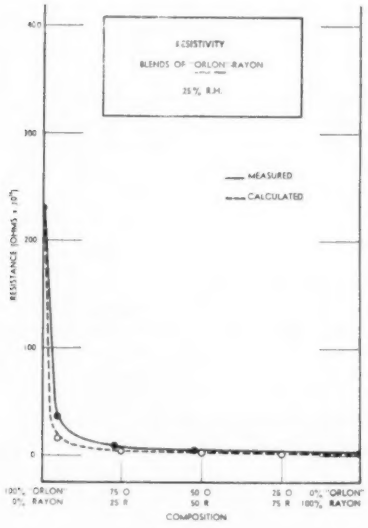


Fig. 14

of 18 to 25 seconds for a standard test sample and surpass the critical burning time of four seconds, as established by the test method. It is well known that fabric flammability is of major concern only in sheer constructions and in those that have a highly napped surface.

Under certain atmospheric conditions fabrics of 100% Orlon acrylic fiber are subject to static build-up during wear. This results in the garment clinging to the body, which may be objectionable. One of the outstanding contributions of rayon in blends with Orlon is its ability to effectively control static. Its influence on static control is strikingly illustrated in Fig. 14. As little as 10% rayon in the blend reduces the static to a level that is acceptable to the normal wearer, in all but the most extreme conditions.

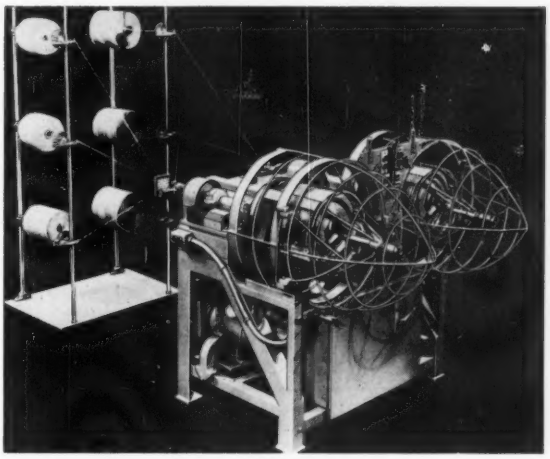
Orlon is outstanding in bulking properties. Blending 25% rayon with Orlon causes a commensurate loss in bulk, but even then with a value for $cm.^3/gm.$ of 2.54, the blend is bulkier than fabrics of other fibers. Rayon gives some marginal improvement in fabric liveliness.

Bending length is a measure of fabric stiffness, which is related to the draping qualities of a fabric; while flexural rigidity is a measure of the tactile stiffness, which is appreciated by the fingers. There does not seem to be very much difference between the two fibers or their blends in these two properties.

Whirlwind Now Royalty-Free

The abolishment of the royalty agreement formerly required between the purchaser of the Warner & Swasey Whirlwind Twister Winder and the Deering Milliken Research Trust, Pendleton, S. C. was announced by the Warner & Swasey Co., Cleveland, Ohio. Previously the purchaser was required to pay a royalty to Deering Milliken based upon the poundage processed over the winder. This is now eliminated and the original purchase price of the machine covers all costs.

The winder is a two-spindle machine designed to perform uniform twisting and precision winding of heavy cords as a single composite operation. The machine can ply from 2 to 120 ends or higher of synthetics, cotton, wool, jute, sisal, glass yarns, etc.



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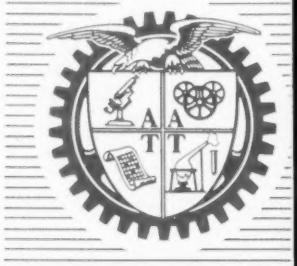


A A T T

Here are the facts about AGILON YARN

What Agilon can do— How it can be used

By Dr. Norman C. Armitage

BECAUSE of the need to protect patent rights, this report will not include facts about the process or equipment by which Agilon stretch or bulked yarns are produced. It may be said, however, that rumors in the industry that Agilon yarns are the result of passing thermoplastic filaments over a blade have a basis in fact. But this is obviously not the whole story. However, it will not be possible to give further details about the processing of these yarns.

Instead we will present in this report the properties and characteristics of Agilon yarns, showing their wide versatility for a large variety of end products.

Presented at the April 4th meeting of the American Association for Textile Technology, Inc.

Norman C. Armitage

Mr. Armitage received his A.B., B.S. and Ch.E. degrees from Columbia University and subsequently a law degree and later his doctorate from N.Y.U. He joined Deering Milliken Research Trust in 1946 as chief patent counsel and held at various times the positions of research director, vice president and president of that organization. He has been vice president of Deering Milliken Research Corp. since its formation more than a year ago.

The process which we have developed can be adapted and controlled to produce yarns of predetermined characteristics suitable to the needs of the fabric producer.

It may be used to crimp a filament or bundle of filaments to any desired extent ranging from a wave to tight coils and thus can produce a mildly bulked yarn, a heavily bulked yarn or a stretch yarn, regardless of total denier, which may vary from 6 to 6000. Since the elasticizing equipment is preferably mounted on a ring twister frame, the Agilon yarn can be taken up in the conventional manner and with a variety of twists depending upon the use to which it will be put. It is thus possible to obtain a great many different finished effects in the fabric products as well as a change in handle and appearance. These ends can be accomplished by varying the degree of bulking or the amount of twist inserted, or both; or by a judicious selection of the filament denier of the raw yarn; or even by mixing a heavy denier per filament yarn with a light denier per filament yarn to get the softness of the finer filaments with the robustness of the coarser ones.

Furthermore, our elasticizing process is applicable to a large number of different fiber compositions. We have been able by a change of treating conditions to process every type of thermoplastic filament with which we have worked. To date most of our experimental work has been with nylon because of the fact that nylon is in more widespread use for more types of end products than other thermoplastic filament yarns. But we have also elasticized acetate filaments, triacetate, acrylics and polyterephthallic esters.

It is also a feature of the process that it is capable of producing a yarn composed of an elasticized thermoplastic filament and an unelasticized component in the same process step. For example, it is possible to obtain an Agilon combination yarn of elasticized nylon plied with a spun yarn of cotton or wool in which the plying is accomplished practically simultaneously with the elasticizing in the same unitary operation and at the same spindle position. Also two or more ends of an elasticized yarn may be taken up together.

In passing through our process, the yarn is subjected to rearrangement of its molecular structure. This causes a shrinking of the faces of the filament so

that the face on one side becomes permanently shorter than that on the other side by a proportion up to between 10% and 15%. This differential shrinking puts a crimp into the yarn in the form of a coil, the diameter of which is a function of the amount of differential shrinkage. By measuring the change in denier after elasticizing, we calculate the theoretical coil size of a filament. Comparing the calculated size with the observed size, it is demonstrable that the elasticity comes substantially from shrinkage of one face of the filament.

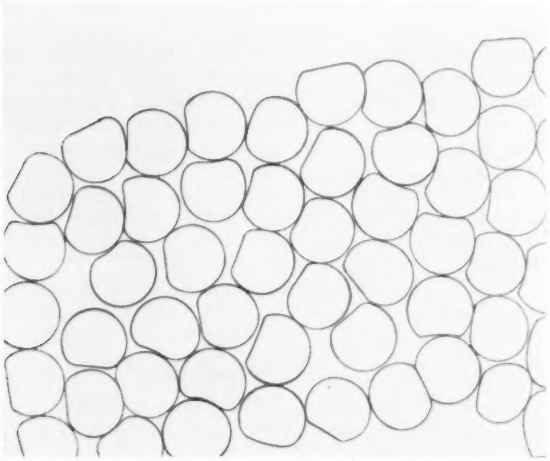


Fig. 1—Photomicrograph of the cross-section of a bundle of 15-denier monofilament Agilon yarns.

This is demonstrated by Figure 1, a photomicrograph of the cross section of a bundle of Agilon 15-denier monofilament nylon yarns, showing the effects of our process in deforming the filament and imposing a flat surface on one face of each yarn. Figure 2a shows this as an idealized cross section with one-sixth of the diameter of the yarn flattened; the original diameter of 1.73×10^{-3} inch is reduced by 1/6 to 1.44×10^{-3} inch. If, then, we look at this monofilament in Figure 2b we have a segment of the coil having an inside radius R_1 and an outside radius R_2, and $R_2 - R_1 = 1.44 \times 10^{-3}$ inch, or $R_1 = R_2 - 1.44 \times 10^{-3}$ inch. We know that our elasticizing process increases the denier of the monofilament from 15 to 16. If we assume that the outer face does not change in length, the inner face must effectively increase by twice the average denier increase.

$$\frac{2}{15} \times 100\% = \frac{R_2 - R_1}{R_2} \times 100$$

Substituting in this equation the value of R_1 found above and converting to millimeters, we find the coil diameter to be 0.55 millimeter. We can make coil sizes in 15-denier monofilament of 0.55 millimeter, but in practice we prefer a different coil size, some 15% to 50% greater.

One of the attributes of Agilon yarns is that they come from the process in a relatively dormant condition with the crimp, elasticity and bulk largely undeveloped. The yarn must be subjected to heat in order to relax it to a condition where the crimp tendency inserted during the processing can assert itself. The ability of the yarn to shrink can be demonstrated by winding a skein of 120 yards on a skeiner having a 54-inch perimeter. A light weight is hung on one end of the resulting 27-inch skein, and the skein is then suspended in water at about 140°F. under the tension provided by the weight. The degree to which the yarn has been elasticized may be expressed in terms of the skein length after suspension in water. The yarn is Agilon 15-denier monofilament nylon and it shrank up from its original 27 inches of length to about 3 inches. Furthermore, in this contracted state, the apparent denier of the tight coils has markedly increased, the diameter becoming some 20 to 30 times that of the unprocessed filament, and the yarn thus shows both high elasticity and high bulk.

Normally the crimp is not developed in the yarn until it goes into the fabric or article into which it is to be woven or knit. The fact that the yarn is dormant as it leaves our process is of great advantage to the fabric producer in that it can be handled in weaving or knitting as easily as or more easily than conventional nylon yarns. Thereafter, in normal finishing, the crimp and elasticity or bulk are developed during a warm scour. Modifications may be made in the finishing techniques to achieve different effects.

The fully developed crimp and elasticity of Agilon yarns are completely and absolutely permanent in respect of time, washing and heating up to a temperature high enough to damage the raw yarn, say, above 380°F. for Type 66 nylon. Furthermore the crimp is not removed by tension until you approach the elastic limit of the raw yarn. We achieve fabric elasticity by the properties inherent in the yarn itself rather than by a knitting construction, and, therefore, may endow a fabric with a two-way stretch. Moreover, the process of producing Agilon yarns is so rapid and the treating conditions are so mild and gentle that there is practically no deterioration of the yarn. Our process

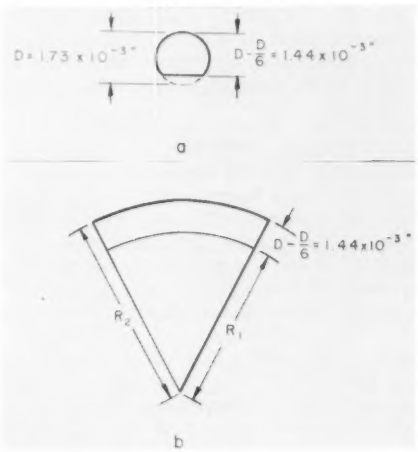


Fig. 2
a—Idealized cross-section of a coil of Agilon yarn.
b—Idealized elevation of a segment of a coil.

requires exposure of the yarn to elevated temperatures but in no case does the temperature exceed 370°F. At such temperature the nylon retains some 95% of its strength after an exposure of about 19 minutes. In our process, however, the exposure time does not exceed half a second. In fact, for hosiery yarns the exposure will not exceed 1/16 of a second either of which time periods is so low as to show that absolutely no heat deterioration occurs in Agilon yarns. Tensions are kept at a very low value (less than ¼ gram per denier) during processing in order not to affect the shrinkage of the inner face of the yarn, so there is no deterioration through stretching.

Again. the effect produced in Agilon yarns is not dependent upon the insertion of twist. The only twist inserted is the low twist (usually no more than 2 to 6 turns per inch) required by the fabric producer for some desired effect, or employed for the purpose of holding filaments or plies together. This amount of twist is far below the safety limit, and there is therefore no torsional deterioration of Agilon yarns.

The fact that Agilon yarns are substantially torque-free gives additional versatility to the knitter. Agilon yarn, as it comes from the process, is balanced. There is therefore no need to balance two ends of opposite hand together in knitting to eliminate torque in the knitted product. It is consequently possible to knit Agilon yarns in singles or in any number of piles.

Successful in Women's Hosiery

The principal field in which Agilon yarn is being used today is women's hosiery. It has been especially successful in seamless because of its non-torque characteristic, which allows it to be knit on single carrier machines. The yarn provides good knittability. Stockings possess high tensile strength and long wear, unique attractiveness both on the counter and on the leg, a mat texture which gives a completely dull appearance and beautiful fitting qualities to hug the ankle. Agilon monofilament yarns and multifilaments up to 40 denier are being used in women's hosiery.

Agilon yarns are fundamentally different from any other yarns. Although they are exceedingly simple to handle, easier in many instances than conventional nylon yarns, for example, they must be handled with a special technique—not a more difficult technique but a different technique. If the fabric producers will assure themselves that, in the first place, they are being supplied an Agilon yarn suited for the purpose for which they intend it and, secondly, that their knitters and finishers are following the instructions and directions which we gladly furnish them, they will obtain results which are consistently "according to sample."

Tests Under Way for Outerwear

In the sweater field, for instance, we have been proceeding very slowly because we want this development to be as near perfection as possible before it is introduced to the public. During the past year, we have worked with a number of select knitters in various parts of the country and have made rapid strides in the development of yarn processing techniques, knitting techniques and finishing techniques applicable to high quality men's and women's sweaters. We have large scale tests under way, and the commercial production of sweaters is near.

Yarn uniformity is of utmost importance, particularly in cut and sewn garments made on multiple feed interlock or jersey circular knitting machines. Manufacturers have been extremely pleased with the uniformity of sweaters made from Agilon yarn and are convinced that there will be no problem in getting yarns which will knit evenly and which will dye with no difficulty whatsoever. Due to the very short heating period (a fraction of a second) to which Agilon yarn is subjected during its manufacture, the dye affinity is substantially unaffected.

The yarn is dormant as it is removed from the supply package on the knitting machine, and it knits extremely well. The yarn tension of each feed must be uniform, but it has been found that the average knitter is able to obtain this tension uniformity with no difficulty. It is not necessary to use any special type of tensioning device on the knitting machine for Agilon yarn. Ordinarily, knitting tensions are adjusted fairly low. Due to the low surface friction characteristics of the yarn as it is knit, we recommend that on circular interlock transfer machines a course of a cotton yarn be knit in just before the separation thread to eliminate the possibility of runs.

The stitch tightness, that is, courses per inch, can be varied over a wide range, dependent only on the adjustment range of the knitting machine itself. Remarkable differences in fabric texture may be obtained by this variation. A tight stitch gives a fabric with good stitch clarity, while a loose stitch gives a slightly crepy surface texture which has aroused considerable interest among a number of manufacturers. Courses per inch are always counted either on the knitting machine with the fabric under tension from the take-up or off the machine while pulling the fabric taut lengthwise. Stitch tightness for a 10-cut interlock machine where an Agilon all-nylon yarn of 210 denier is used may be varied from 11 to 15½ courses per inch to produce a range of stitch clarity and crepiness; which effect is better and more desirable is entirely a matter of preference, another aspect of Agilon yarn's versatility.

Versatility is also available in the hand of knitted outerwear made from Agilon bulked yarns. Since there is no limit to the denier per filament of the raw yarns that can be processed, coarse denier yarns which give a crisp, firm hand to very fine denier yarns which give a soft hand, not unlike a cashmere or a spun silk, can be used. From the work we have done and the reactions we have had to date from the sweater manufacturers, we shall probably recommend to our licensees that Agilon yarns to be initially offered to the trade be those of 2 denier per filament or a combination of 2 and 3 denier per filament.

A general rule for selecting the right total denier in an Agilon nylon yarn for sweaters is to use a denier about 75% as heavy as would be chosen for a high bulk Orlon yarn in the equivalent construction. Agilon yarns of 210 to 240 denier have been found satisfactory for 10-cut interlock, and 350 to 480 denier for 12-cut jersey transfer. The selection depends to a great extent on the weight of fabric desired and the preference of the manufacturer.

Snagging Precautions Advised

The greige fabric should be handled with care to avoid picking. Since fabric bulk and body are not developed until the finishing operation, any surfaces with which the greige fabric comes into contact, whether of take up, tables or hands of the operatives, should be entirely smooth. Similarly, the finisher, too, should observe the precaution of seeing that all contact surfaces of the dyeing equipment are smooth, and it is advisable for the operative to wear gloves when loading the fabric.

As the greige sweater fabric is removed from the knitting machine, the individual stitches are long and oval in shape due to the take-up tensions on the machine. The conventional finishing technique for sweaters comprises scouring and dyeing while completely relaxed in a tumble wash wheel or paddle machine. If fabrics from Agilon yarn are scoured and dyed in this manner and under complete relaxation, they will crinkle and develop bulk and bloom as the yarn contracts, and there is therefore a tendency for the stitches to pull into a more round configuration with a diameter somewhat greater than the width of the original oblong stitch. This usually results in con-

siderable fabric shortening and some fabric expansion.

Fabric expansion in the body of the sweater fabric causes no great difficulty in that it can be compensated for during knitting by the diameter of the machine used and the number of courses knit. However, for the ribbing to expand is sometimes most disastrous. The best ribbing is, of course, a very narrow ribbing with good extensibility and rapid recovery. We have therefore modified the conventional finishing technique.

The technique which we have developed not only gives a considerably superior fabric, but fortunately it is a much less expensive finishing process than the one which is usually used for fabrics of conventional yarns. It is particularly less expensive than any finishing technique used for sweaters where the finished sweater must be thermoset.

Scouring Begun in Cold Water

Our finishing procedure comprises scouring the greige fabric in rope form in a dyebeck, similar to the technique used for yard goods. The fabric rise from the water level to the center of the dyebeck reel should be controlled to a distance of about 6 feet. This gives approximately the optimum lengthwise tension on the fabric to control the direction in which the stitch deformation takes place and it results in a rather narrow elongated fabric with an excellent rib.

The scouring of the greige fabric is begun in relatively cold water. The temperature is raised about 2° per minute up to 180°F. It is advantageous to run the temperature up to the boil and to run at this high temperature for at least 15 minutes. This high temperature scour with the fabric under controlled tension serves to stabilize the fabric and to give it all the heat setting it needs, so that sweaters made from Agilon yarns and finished in this manner are completely dimensionally stable to ordinary hand washings or mild machine launderings.

Fabrics Require no Steaming

The scoured fabric may be dyed in rope form while it is in the same dyebeck. After the dyed fabric is rinsed properly, about 2% of a cationic softener is usually exhausted upon it to give a slight lubrication to the fibers. It is then centrifugally extracted and tumble dried. It is most amazing to see these fabrics come out of the dryer. They come out light, fluffy, soft and with almost no wrinkles. Actually, we have not even found it necessary to steam the fabric on frames; it is simply straightened and is then immediately ready for cutting and sewing.

Sweaters made from Agilon yarns are soft, bulky, warm, and have an extremely neat appearance. They can be made on very fine gauge machines with fine yarn; can be knit tight or loose. Being made from continuous filament, they do not pill. We have sweaters which have been worn on test and washed a dozen times in automatic home washers. They have retailed their shape perfectly with absolutely no pills.

Sweaters and other knit outerwear made from Agilon combination yarns such as combinations of the bulked nylon filament with wool, Vicara or other spun yarns, are also of interest and offer even more versatility. Such combination yarns give the general appearance of the spun yarn with the strength, durability, stretch and non-pilling characteristics of the filament nylon.

Our work with Agilon yarns has gone into many and varied fields, including half hose and woven and knitted fabrics for blouses, lingerie, and children's underwear. We are devoting a considerable effort to rugs and carpets of Agilon yarn. We have worked with several manufacturers, both weavers and tufters, to produce radically new floor coverings for the American market.

Great Possibilities Seen in Carpet Field

Agilon yarns, ranging from 2,000 to 6,000 total denier (138 to 46 yards per ounce) have been processed into carpets of both woven and tufted manufacture. A wide variety of new and unique surface effects have been obtained. The nature and degree of the surface effect can be varied by changes in the technique of producing the Agilon yarn. In tufted carpets, for example, the frequency of tufts and the pile height can also be varied to produce different effects. When using a 5/32 inch gauge tufting machine, excellent results have been obtained with Agilon yarns of 3,000 to 5,000 total denier at 8 to 10 stitches per inch and with a pile height of 1/2 to 9/16 inch; on 3/16 inch gauge machines, yarns in the range of 4,000 to 6,000 total denier at 7 to 9 stitches per inch and with about the same pile height have given a most satisfactory product.

The continuous filament nature of these yarns gives a considerable improvement in ease of handling during weaving or tufting as compared with spun yarns. The absence of loose fiber ends, slubs and weak spots facilitates the manufacture of the carpet. Creel breaks and other machine stops for yarn defects are virtually eliminated.

It is sometimes preferred to develop the bulk and loftiness of the yarn prior to weaving or tufting. This sequence of operations permits greater contraction than when the yarn is more firmly held in a fabric and prevented from moving as freely.

In the usual sequence, Agilon yarn is put into the carpet before being developed, and the carpet looks rather lean and hungry as it comes from the loom or tufting machine. Upon scouring or dyeing during finishing, the Agilon yarns bulk and increase in volume to produce a firm and attractive carpet surface. As a carpet fiber, Agilon yarns have high crush resistance, long wear life, good resilient properties, ease of cleaning, and complete resistance to mildew or insect damage. Since Agilon yarns are essentially continuous filament yarns, there is a notable lack of fuzzing or pilling, a distinct advantage as compared with carpets made from conventional spun nylon yarns.

Add Dye to Cool Liquor

Where piece dyeing techniques are used to finish the carpet, it should be placed in the kettle and the reel started in motion with the water at about room temperature. The temperature is then increased to 160°F. over a period of approximately twenty minutes, and the contraction and bulking of the Agilon yarns are uniform and practically complete.

Where Type 6 nylon is used, one precaution is needed to insure level dyeing. The dyes should be added to the liquor when it is relatively cool (about 80° to 90°F.) and the carpet should be allowed to work in this dye liquor for about 15 minutes before the temperature is raised. The temperature should be raised to about 160°F. at a rate of rise of about 4° per minute. The rate of rise is then reduced so that the dye liquor will reach the boil in about one hour from the start of the operation. For Type 66 nylon, the

(Continued on Page 72)

How to use AGILON STRETCH NYLON in women's stockings

By Cyril G. Evans

IT WILL READILY be appreciated that the behavior of Agilon monofilament yarn in a stocking fabric is different than Agilon multifilament yarn. The monofilament yarn gives the fabric stretchiness by bulking it by a three dimensional movement of the fabric construction. The multifilament gives stretchiness by a bulking of the fabric due to bulking of the yarn itself. In practice we find a transition from the one system to the other, so that all yarns up to 15-denier tend to behave like monofilament in their method of giving stretch to the fabric; twenty-denier 7 filament is something of a transition yarn and 30-denier on upwards impart elasticity more by bulking of the yarn than by movement of the fabric construction. Figure 3a shows a relaxed hose of Agilon 15-denier monofilament yarn, and Figure 3b shows the same fabric stretched out. Figure 4a shows a 20-denier filament hose relaxed, and Figure 4b shows the same hose stretched out. It will be observed that in the relaxed hose the stitches are not nearly so jumbled as in the relaxed 15-denier monofilament hose, but that the yarn itself is bulkier than in the stretched out hose. Figure 5a shows a portion of 40-denier 14 filament yarn relaxed in welt fabric, and Figure 5b shows the same thing with the fabric stretched out. The bulking effect of the yarn in the relaxed fabric is now even more pronounced.

Figure 6 shows a 15-denier monofilament, a 15-denier 3 filament, a 20-denier 7 filament, a 30-denier 10 filament, and a 40-denier 13 filament strand, each taken from a relaxed skein. It will be seen from the figure that the 15-denier monofilament has a regular crimp which, if it were not sandwiched between sheets of glass, would be a helical coil like a spring. The 15-3 tends to be the same. As the filament count rises, so does the yarn become more of an irregular jumble of filaments with the filament forces opposing each other. This results in a yarn capable of big changes in bulk on being tensioned and relaxed. But this yarn is not so capable of exerting external forces tending to jumble stitches as the monofilament yarn where the only way it can bulk the fabric is to jumble up the stitches.

Now in a multifilament yarn where the shrinkage results from a coiling up of a multiplicity of filaments, the skein length gives a fair picture of the degree of elasticizing. However, with a monofilament yarn, the skein length only reveals the spring constant of the coiled filament which is itself controlled by the size of the coils, the modulus of elasticity of the filament forming the coils and the twist in the filament or torsional stress. But in a system gaining elasticity from deformation of the fabric construction, all these factors are important and will be discussed further in relation to monofilament yarns.

Dr. Armitage in his report has made reference to the method by which Agilon yarn shrinks or curls, and to the fact that there is a limit to the tension which may be applied to the yarn before the tightness of the coil is decreased.

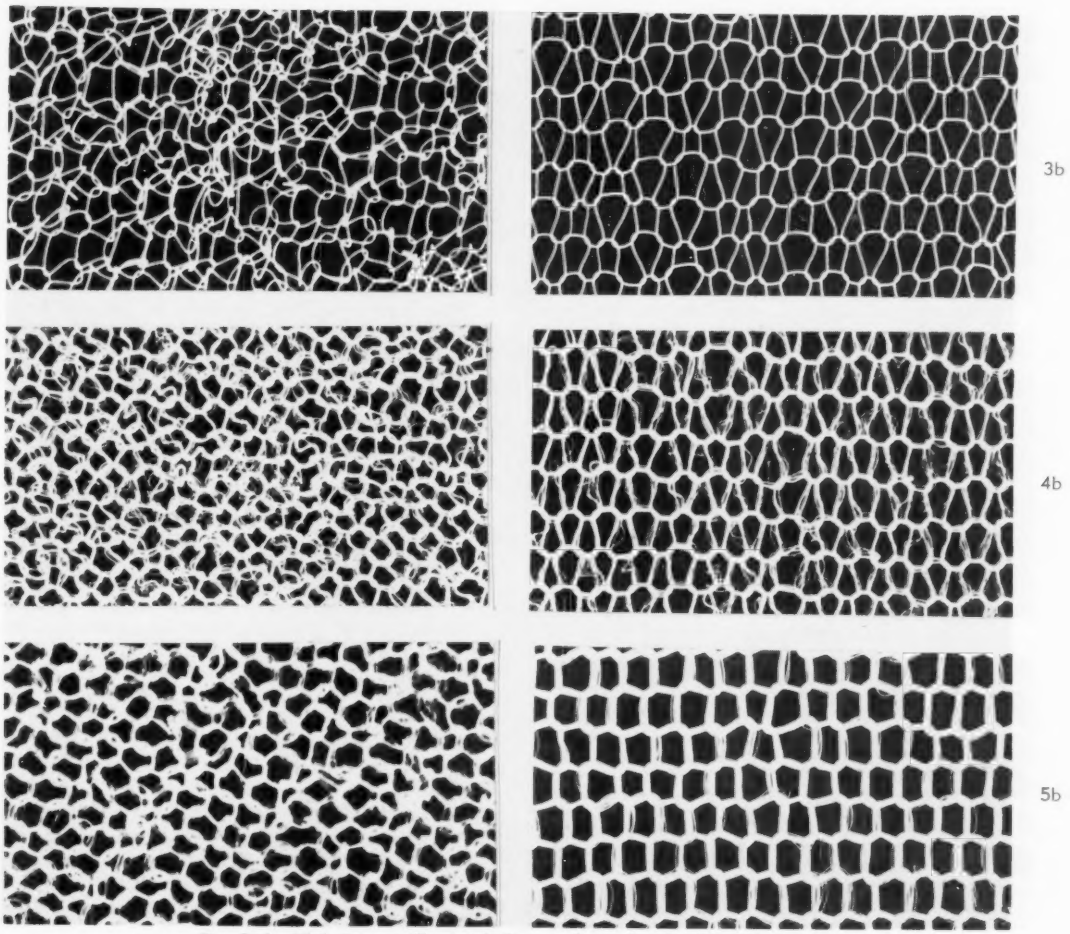
In order to produce deterioration, the shrunken face of the yarn must be stressed beyond its elastic limit. This limit varies considerably with humidity, temperature, rate and time of loading. For a weight hung on the undeveloped yarn for five minutes, absolutely no deterioration takes place if the weight is less than 0.4 gram/denier. Thereafter there is an increasing amount of deterioration until the crimp development is completely removed at around 3 to 4 grams/denier in normal room conditions.

Figure 7 shows a typical stress-strain curve for 15-denier monofilament Agilon nylon and plain nylon made on an Instron tester at a constant rate of strain of 1 inch per minute at a temperature of 70°F. and a humidity of 65%. It will be seen that there is a sudden change in slope of the stress-strain curve at 6 grams and again at 57 grams; that is, 0.4 grams/denier and 3.8 grams/denier. The first change in slope is thought to be the load at which removal of the crimp commences, and the second change the point at which all crimp is removed and the unshrunk face of the yarn commences to elongate irreversibly. In terms of an undeveloped 15-denier woman's hose, there would be no permanent loss in elasticity in the yarn if a weight of 11 lbs. was to be hung on the stocking indefinitely and to remove the elasticity completely, a

Presented at the April 4th meeting of the American Association for Textile Technology, Inc.

Cyril G. Evans

Mr. Evans entered industry in 1952 when he joined Deering Milliken Research Trust, where he now supervises Agilon research. He graduated from the University of London in 1941 and was elected an Associate Member of the Institution of Civil Engineers in 1946. He worked on many aspects of plastics for structures at the Royal Aircraft Establishment and for two years had charge of the plastics technical work at the British Air Commission in Washington, D. C.



Figs. 3a-b—15-denier monofilament Agilon yarn hose relaxed and stretched out.
Figs. 4a-b—20-denier 7 filament Agilon yarn hose relaxed and stretched out.
Figs. 5a-b—40-denier 13 filament Agilon yarn welt relaxed and stretched out.

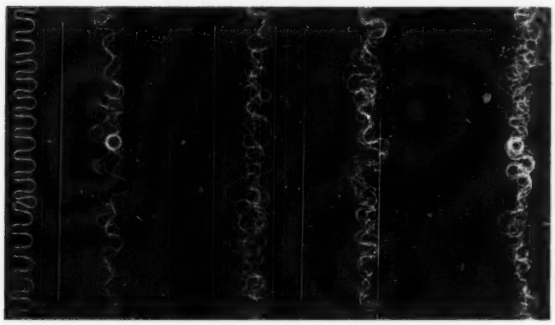


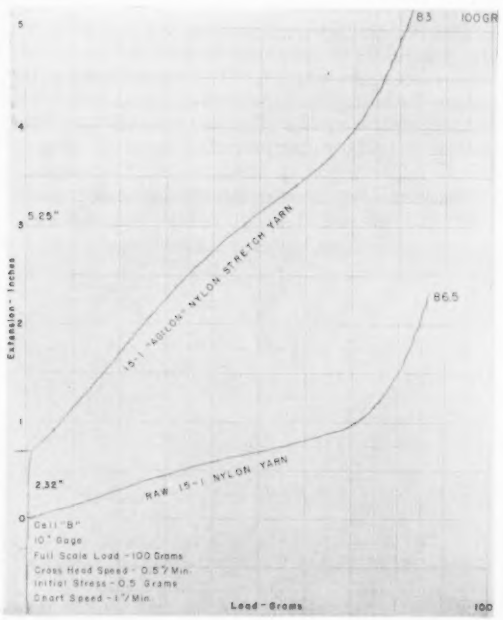
Fig. 6—Single strands of Agilon yarn with crimp developed. Left to right: 15-1, 15-3, 20-7, 30-10 and 40-13.

weight of about 100 lbs. would have to be hung on the stocking, supposing this was possible. Once the elasticity is developed and the stocking boarded, only about 2/3 of the latent elasticity is used.

Monofilament Yarn

Figure 1 in the preceding report by Dr. Armitage shows Agilon 15-denier monofilament nylon yarns clearly indicating the slight flattening of the cross section on one side of each filament. If this deformation is kept less than about ¼ of the area of the circle, it will not be noticeable in finished fabric. However, it

Fig. 7—Stress-strain curves for Agilon yarn and plain nylon yarn.



can give trouble in knitting if no account is taken of it as the flat face tends to cling to guide surfaces, thereby backing up the small amount of twist in the yarn (2 TPI) until it reaches a level at which it will pass on through the guide point. This level varies with yarn tension so that fluctuating yarn tensions can, in extreme cases, produce patterns of twist variation in the fabric. The region in the free yarn in which twist is highest will also have a tendency to form kinks which do not easily pull out. Therefore, low steady tensions and minimum pressure on the yarn at guide points are the rule for best results.

Since the fabric is to gain its elasticity by deformation of the stitches, the natural size of the coil in the Agilon yarn is of the utmost importance. For, if the natural size of the coils matches the size of the knitting stitch, there will be no elasticity in the fabric.

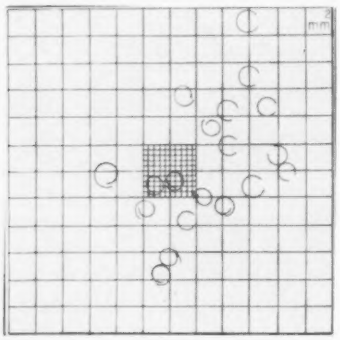
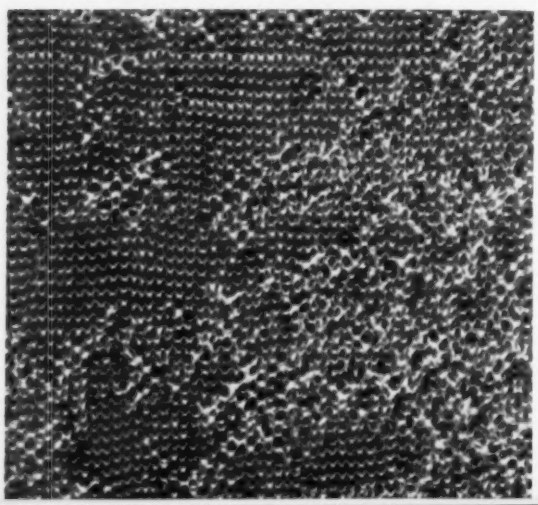


Fig. 8—Sketch of a determination of coil size using the Projectina projection microscope.

Figure 8 shows a method of determining the coil size in a 15-denier monofilament Agilon yarn. A skein of yarn has been made and the elasticity developed. The yarn is then chopped with scissors onto a piece of black felt. Some 20 of the coils of yarn have been picked off the felt and sandwiched between two microscope slides. These have been placed in a Projectina projection microscope fitted with a gridded screen calibrated in millimeters.

In practice, it is found that, if the coil size of the Agilon yarn falls in the range of 0.54 to 0.58 or 0.62 to 0.8 millimeters, no patterns are formed with knitting machines currently in use. This coil size is controlled in manufacture and the yarn as received by a knitter should meet this requirement. Figure 9 shows the phasing of crimp with knitting stitch in a laboratory sample. In this case, the average crimp size by the above method of determination was 0.90 mm to 0.92 mm.

Fig. 9—Illustration of 15-denier monofilament Agilon yarn hose, showing the phasing of coil size with knitting stitch size.



This phasing of crimp with the knitting stitch usually presents itself in the form of flat spots which tend to form rings. It will most likely occur in the ankle in seamless hosiery because here the stitch is tightest. In full-fashioned hose, the crimp size is less critical as the stitch size is a constant, giving one a bigger margin of safety.

If the yarn is subjected to tensions in excess of 0.4 gram/denier, the coil size may be increased. In yarn which is near to the top size of the coil specification, loss of elasticity in the fabric will result. The place where this can occur is in circular knitting machines fitted with a pull-down mechanism. If this load exceeds ¾ lb. on a 400 needle machine, some trouble results and increasingly so as the pull is increased. This indicates that at the knitting needles, the weight is not taken equally by all the stitches, for if it were, 11 lbs. would be needed to do any damage.

Knitting Agilon Stretch Yarn

Twenty, thirty and forty denier Agilon yarn may be knit using conventional techniques and does not ordinarily give any difficulty. The following notes are directed mainly to the knitting of yarns up to 20-denier and more specifically 15-denier mono-filament. The secret of success in knitting Agilon yarn is to use even, low tensions. All the precautions discussed here are aimed directly or indirectly at getting the minimum tension variation in the yarn at the knitting needles and holding a steady tension on the yarn from the supply package to the knitting needles.

Agilon yarn is not lively as pulled off the package. But in monofilament, if twist is allowed to back up between the supply package and the knitting needles as discussed in the paragraph on monofilament yarn, then the region of high twist will be lively. By the nature of nylon, any liveliness is greatly exaggerated when the humidity falls below 50%. In the laboratory, Agilon yarn may be knit without any finish on it at humidities above 60%. In most mills the humidity is well below 60% and a finish must be used; its function is to apply a film of plasticizer to the surface of the yarn so as to condition it to the mechanical state it would be in at 60% R.H. without a finish on it. The finish must also be a good lubricant and allow free delivery of the yarn from the supply package.

In full-fashioned knitting a cap must be used on supply packages to cover rough places on the nose of the package. The cap must also be able to hold a steady tension on the yarn during the intermittent action of the machine so as to prevent the formation of kinks in areas in which a high twist has been backed up. This tension also reduces the level of twist in these areas.

The cap fitted with nylon bristles, suggested by Mary Grey Hosiery Mills, works very effectively. Dancing weight tensioners should on no account be used with monofilament yarn. Figure 10 shows the thread-up used on a Wildman full-fashioned knitting machine, a conical cap with bristles being used on top of the supply package. Note how the guides have been arranged so that the yarn path is not turned through an angle of more than 60° by each guide, and how the dancing weight tensioner has been by-passed. The tension is adjusted by raising or lowering the guide immediately above the supply package.

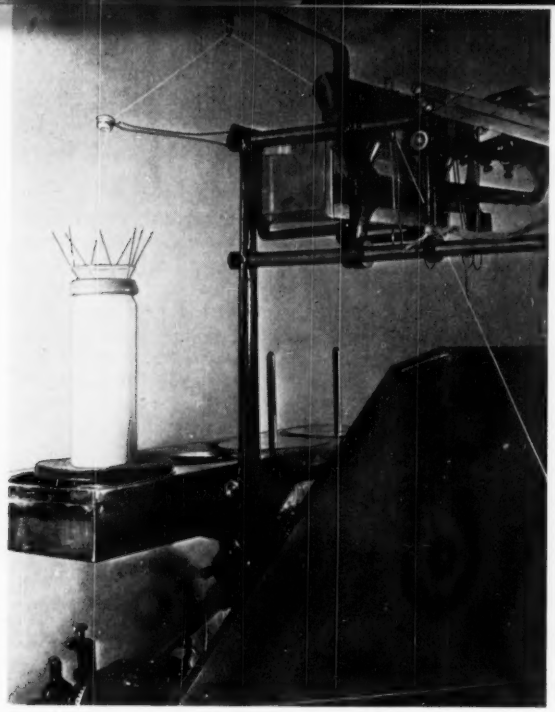


Fig. 10—Thread-up for Agilon 15-denier yarn on Wildman full-fashioned machine.

Fig. 11 shows the thread-up on a circular knitting machine. Note that the yarn supply is wound on a $10\frac{5}{8}$-inch cone, which is the take-up package on the equipment for producing Agilon yarns. Redrawing operations which might damage the yarn are thereby avoided. In circular knitting a cap must also be used, but here, while it holds the yarn off rough places on the nose of the supply package, its chief function is to control the balloon tension. This is done in conjunction with the guide eye set above the cap. The cap and guide eye are so arranged that the tendency to form a double balloon as the yarn runs off the package is avoided. As soon as the single balloon becomes unstable, the balloon tension rises. It falls again when the balloon reverts to stability. Taking yarn from a tall package without a balloon control, some where on the way down the wind on the package, the balloon may change its form and alter the tension level right through the knitting machine. This will result in a series of rings in the hose corresponding to the package wind.

Use of too low knitting tension or not lining the guide with the axis of the supply package gives a similar defect which, broadly speaking, may be called cyclic variation of tension. Fig. 12 shows two records of tension made by a Brush tension analyzer during the knitting of a stocking. Figure 12a shows an acceptable level of tension ($\frac{3}{4}$ gram). Figure 12b shows an unacceptable cyclic variation resulting, in this case, from the supply package being offset from the guide eye.

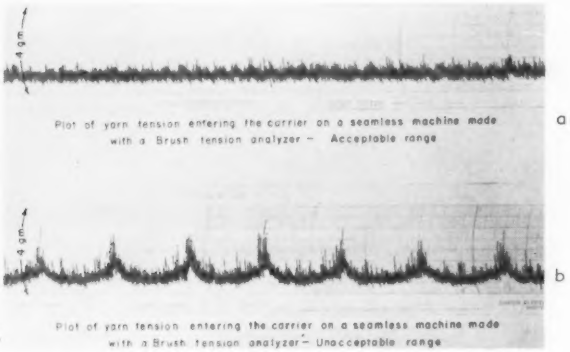

4 gm.
Plot of yarn tension entering the carrier on a seamless machine made with a Brush tension analyzer – Acceptable range
a
4 gm.
b
Plot of yarn tension entering the carrier on a seamless machine made with a Brush tension analyzer – Unacceptable range

Fig. 12—Plot of yarn tension entering the carrier on a seamless machine made with a Brush tension analyzer. (top) Acceptable range. (bottom) Unacceptable range.

As mentioned, earlier use of the pull-down mechanism with $\frac{3}{4}$ lb. or more load will be sufficient to reduce the coil development in the yarn on finishing. This will increase the over-all size in the yarn so that the size is running in an unsafe region. The greater the pull used the higher the percentage of hose which will show the defect.

Of course, all normal precautions to reduce tension plucks or cyclic variation in tension should be taken. The supply must be set centrally under the first guide eye; the yarn must not hang momentarily anywhere on the package or on the cap. The wind of the yarn on the supply must not come very close to the underside of the cap and the yarn should not be allowed to fall off the package in unwinding and get trapped under the end. The guides used in the machine must not be used after a groove has been cut into them by the yarn.

Finishing

The first operation in finishing Agilon hose after seaming or looping is to develop the crimp in the yarn. This is done by a scouring procedure. In cold water the crimp in Agilon does not develop to its full extent, and final development is done at 180°F. This is important to the complete and even development of the elasticity. The hose are first put into cold water in a wash wheel and agitated for some 30 minutes. This agitation allows the slight variations in twist to equalize with the assistance of the lubricant present on the yarn and without restraint from the crimp.

Sufficient detergent to give a good running suds when the water is hot is then added and agitation continued in the cold long enough for the lubricant to be removed completely from the yarn so as to get even wetting (30 minutes). The temperature is then raised to 180°F. in not less than 15 minutes and is maintained for five minutes. This allows the crimp to develop fully and the suds provide lubrication for the yarns to slide on each other as the crimp develops.

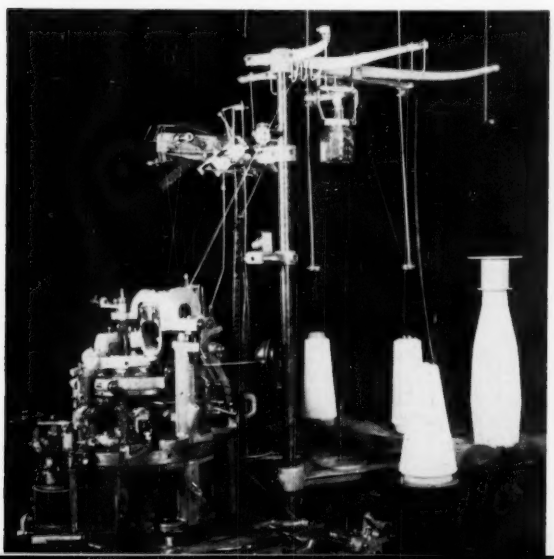


Fig. 11—Thread-up for Agilon 15-denier yarn on a circular knitting machine.

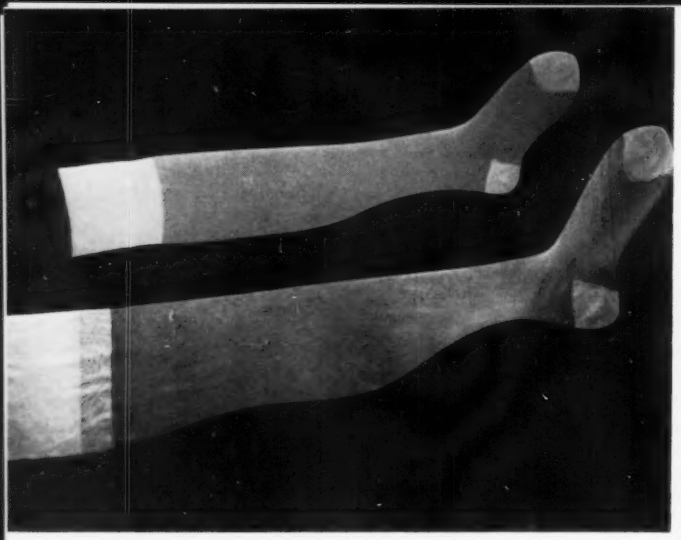


Fig. 13—Illustration showing Agilon hose lying beside regular nylon hose.

Two rinses in cold water finish out the procedure. A boarding lubricant should be added to the final rinse if it is proposed to board the undyed stockings. However, the stockings may be dyed in the same wheel, in which case the boarding lubricant should be added after dying.

If the stockings are dyed before boarding, some care has to be exercised in choice of dyestuff to avoid light colored patches in the welt, toe and heel areas, apparently resulting from poor penetration by the dyestuff. If stockings are boarded before dyeing, there are no unusual difficulties in getting a level shade. The stockings may be boarded in the conventional manner in use in the mill at which they are being finished except that small boards must be used as, once boarded, the stockings will not shrink to a size smaller than the board. Every manufacturer will have his own ideas about the boarded size and shape of the stocking. But as a guide, the distance from heel to top of welt should be about 20 inches. The minimum ankle width should be about 3 inches and the calf width about 4½ inches.

Figure 13 shows a stocking of Agilon yarn beside a regular nylon stocking and demonstrates how the stocking may be a miniature of the regular stocking because it has a two-way stretch.

Agilon Yarn

(Continued from Page 67)

ordinary dyeing procedures already in use in the carpet industry are readily adaptable to carpets of Agilon nylon yarns.

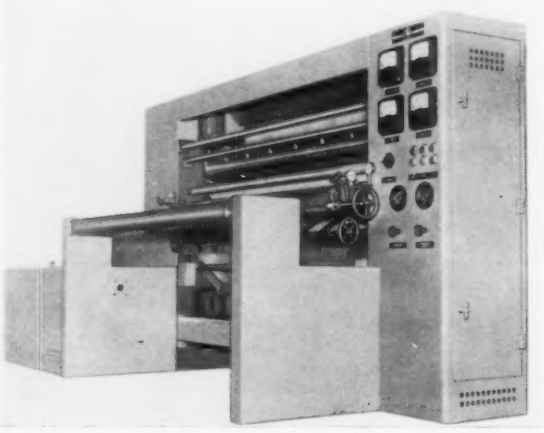
For mills doing skein dyeing of yarn, the requirements are essentially the same as when using spun yarns but with a couple of exceptions. First, for Type 6 nylon, the dyes must be added to the dye liquor at a relatively low temperature (80° to 90°F.) and the same working period as has just been described must be followed to insure level dyeing. Upon dyeing, Agilon yarns will contract to about 60% of their length as skeined and there must be a relatively free wind of the skein in order to allow even contraction.

High denier Agilon yarns have also been developed for the upholstery industry, and upholstery fabrics have been produced on Jacquard looms. This work has only recently been started, but there are indications that cover superior to that with conventional filament yarns can be obtained. In this type of fabric, the normal latexing operation, during which the fabric is subjected to a combination of moisture and heat, develops the yarn completely.

These few examples of the use of Agilon yarns in all types of fabric from the sheerest hosiery to rugs and carpets clearly point up the variety and versatility of these yarns. Here is a yarn development which can be used by fabric designers and engineers, stylists, fashion leaders and aggressive manufacturers to revolutionize whole segments of our industry.

AATT Field Trip to be held in May

On May 22, a field trip to last through the day following will be held by the American Association for Textile Technology. Members and guests will leave New York City by evening train on May 22 and arrive at Natick, Mass., the following morning. They will tour the Quarter Master Corps Laboratory at Natick in the morning. In the afternoon, the party will visit the Fabric Research Laboratories at Dedham, and return by train to New York. Cost of the trip is $33. Reservations may be made by writing Jack Press, Tour Director, at 302 96 St., Brooklyn, 9, New York.



New Compacting Machine Introduced

A new machine for "compacting" textiles was introduced at the annual meeting of the Textile Research Institute in New York City in March. According to Fabric Research Laboratories which developed the machine and Riggs & Lombard, Inc., who make it, the machine is designed to stabilize fabrics and yarns against shrinkage by totally new methods.

It is said to be effective on a wide range of fabrics and yarns whatever their fiber or blend content. In addition to stabilizing against shrinkage, the machine is said to improve the texture and appearance of fabrics. Dr. Walter J. Hamburger of Fabric Research Laboratories will speak on the machine at the May 2 meeting of the American Association for Textile Technology at the Hotel Vanderbilt in New York City. The complete text of his talk will be published in our June issue.

New MACHINERY

New EQUIPMENT

Long Wearing Picker Teeth

Long wearing picker teeth for all types of picking applications are offered by Robert A. Main & Sons, Inc., Paramus, N. J. According to the company, the picker teeth will stand up under hard usage much longer, since they have been specially heat treated and made of alloy materials. Such longer wearing picker teeth would assure the mill of lower maintenance cost by having shorter down time between changes of cylinders. *For further information write the editors.*

Stiffness Tester

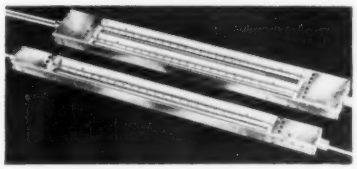
Fabric Development Tests has made available its Drape-Flex stiffness tester which conforms to the requirements of the new ASTM method D-1388-55T for testing fabric stiffness. The standard angle of inclination has been changed from 43° to 41½° in accordance with British standards. A levelness indicator has been included in the unit and suitable means have been provided for adjustment. A reversible scale permits reading test results in inches or centimeters.

For further information write the editors.

Picker Rod Lubricant

Garland Manufacturing Co. has developed a picker rod lubricant said to have exactly the correct amount of tackiness to firmly adhere to picker rods, eliminating mess and waste. The company is also offering a plastic squeeze slide applicator, designed to fit any type of rod, that screws on the tube-cap threads. According to the company, the squeeze slide applicator requires fewer applications and lasts longer.

For further information write the editors.



Infrared Drier

An infrared drier has been developed by The J. E. Doyle Co., Cleveland, Ohio. The dryer uses a General Electric quartz tube heating element. These units are said to come up to heat instantly when electricity is turned on so that full drying capacity is effective immediately. According to the company, the driers are best suited for sheet or web fed printing presses for rapidly drying ink, for treating and conditioning coatings on paper, fiber and textiles, and are effective with synthetic resins which react favorably under high flash heat, as well as impregnating processes using lattices or impregnating compounds. The heating length of the drier is 25".

For further information write the editors.

Butterworth Pressed Roll

The Pressed Roll Division of H. W. Butterworth & Sons Co., Bethayres, Pa., is offering a pressed roll for use in such finishing machinery as water mangles, embossing and chasing calenders. According to the company, a series of quality-control tests are maintained at every step to insure exactly the right degree of hardness and smoothness for every pressed roll need. The rolls themselves cannot loosen or slip, since they are locked on a forged steel shaft under controlled pressure. These "Dura-Smooth" rolls are furnished new or refilled.

For further information write the editors.

Centrifugal Screener

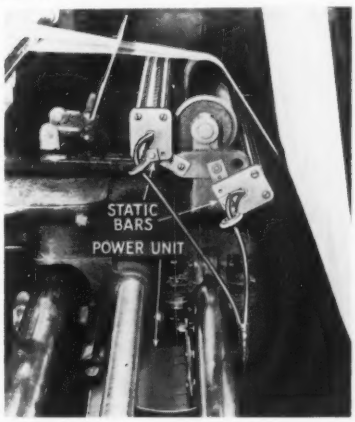
Roto-Screen, a centrifugal screener, offered by Patterson-Kelley Co., Inc., is said to eliminate waste water in laundry and dye equipment. The screen removes objectionable matter from re-usable solutions in a variety of process industries. Roto-Screen is a perforated steel cylinder with an enclosed bottom. Installed in a sump and rotated at high speed, the "basket" forces away the solid particles in suspension by centrifugal force, allowing clear liquid to be pumped through the basket and delivered to the heat reclaimers.

For further information write the editors.

Shockless Static Bars

The Simco Co., Lansdale, Pa., has announced the availability of their Type HE shockless static bars for horizontal warpers. Advantages of the bars are said to be elimination of flying ends, prevention of overlapping and entangling of adjoining section edges. The bars also do away with warp section marks and permit closer spacing of the sections. According to the company, the bars are truly 'shockless', since they accomplish full static elimination on a horizontal warp running at top speed.

For further information write the editors.



Textile News Briefs

Summer Laboratory Courses

Brooklyn Polytechnic Institute announced that it is offering its 13th annual series of summer laboratory courses starting May 28th. A new feature of this year's program is a series of general evening lectures in polymer chemistry to meet the interests of scientists in the Metropolitan area who do not wish to enroll in the laboratory part of the course.

Whitin Annual Meeting

The annual stockholder meeting of the Whitin Machine Works was held on March 19th in the company's offices and was followed by an organizational meeting of the board of directors. Mr. Orrin G. Wood of Estabrook & Co., Boston, was elected to the board of directors as an additional member; and both Mr. E. Kent Swift, Jr. and John H. Bolton, Jr. were made vice presidents.

Courtaulds Plans New Building

Courtaulds (Alabama) Inc., producers of Coloray, solution-dyed rayon staple fiber, and white rayon staple, will shortly begin construction of a textile research and development laboratory and pilot plant at the company's plant site at Mobile, Alabama, it was announced by Charles L. Paine, President.

Raymond W. Hess

Schoellkopf Medal

Raymond W. Hess, coordinator of pollution research for National Aniline Division, Allied Chemical & Dye Corp. will be awarded the 1956 Jacob F. Schoellkopf Medal of the Western New York Section of the American Chemical Society. The award will be made on May 15th at a meeting of the Section to be held at the Buffalo Launch Club, Grand Island. The Schoellkopf Medal is awarded annually to an outstanding chemist or scientist in that area.

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U.S. ACME
for every
Throwing Requirement
You name it—stretch yarns or bulk yarns, glass or metallic yarns, special process yarns, etc. . . . U. S. Textile is at your service with machines and know-how!
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SCRANTON 8, PENNA., U. S. A.
Designers and Builders of Profit-Producing MODERN THROWING EQUIPMENT for Silk and all Synthetic Yarns

New Draper Board

With the purchase of Wildman Mfg. Co. by Draper Corp. completed March 8, a stockholders meeting was held on the same day. At this meeting the following members of the Board of Directors were elected: Thomas H. West, president; Charles F. Miller, vice president and general manager; Kenneth Howie, vice president; Claude F. Snider, treasurer; Robert D. Donley, secretary; Warren D. Oliver, Partner of Herrick, Smith, Donald, Farley & Ketchum; J. Willard Morgan, assistant treasurer.

Mr. Charles Miller has been appointed as general manager of Wildman Co., a position he also holds with Jacquard Knitting Machine Co., Inc., a wholly-owned subsidiary of Draper Corp. Mr. J. Willard Morgan, assistant treasurer, formerly of the Draper office at Hopedale, will move to Norristown to assume his new duties. H. Walton Wood, a member of Wildman Mfg. Co. for many years, has been elected assistant secretary.

Printed Textile Exhibit

An exhibition of printed textiles opened April 27 at the Cooper Union Museum for the Arts of Decoration, and will continue through August 31. No admission will be charged. The exhibit contains three sections: historical, technical, and contemporary. Special programs will also be sponsored during the show. These will include talks by noted textile designers, films and demonstrations, and panel discussions.

Merger Considered

West End Chemical Co. and Stauffer Chemical Co. announce that representatives of their Boards of Directors are giving active consideration to a proposal for a merger of the companies. Under the terms of the proposal it is contemplated that West End will continue to operate under its present management as an autonomous division of Stauffer.

Draper Increases Storage Space

To bring warehouse capacity in line with recently increased foundry and machine shop facilities, Draper Corp. will add 20,000 sq. ft. to its warehouse at Spartanburg, S. C. The addition will be a one story brick and steel structure designed to increase storage space and to allow for the installation of a conveyor system to expedite shipping of loom parts, changeovers, and new attachments.

Arnel Technical Bulletin

A technical bulletin which provides information on dyeing, printing, finishing and heat treating Arnel fabrics and blends containing the Celanese triacetate fiber is now available.

Textile Advertising Guide

In a move aimed at eliminating inaccurate and misleading fiber descriptions in the advertising of apparel, rugs, piece goods, and other textile products, the Better Business Bureau of New York City released its newly published "Guide for Retail Advertising of Textile Fibers". The 19 page guide was developed following a year-long series of meetings between the Bureau and representative retailers, textile companies, and yarn producers.

Poplar Textiles Expands

Expansion of manufacturing and warehouse facilities to allow for a 50 percent increase in production has been announced by Poplar Textiles, Inc. According to the company, their new Philadelphia plant will carry on operations around the clock six days a week. It will combine the firm's manufacturing and warehousing operations under one roof.

LTI Bulletin Available

A new technical bulletin has been issued by Lowell Technological Institute, available free upon request by writing the Institute at 1 Textile Avenue, Lowell, Mass.

"The Effect of Certain Physical Characteristics of Fabrics upon Heat Transmission" was prepared and written by David L. Aelion, graduate student at LTI in 1952-53, and Prof. Harry C. Brown, chairman of the division of engineering.

Silicones Production Increasing

Union Carbide and Carbon Corp. announced that several units of their Long Reach, W. Va., plant of Silicones Div. are now in operation. According to the company, the plant was built to meet the expanding demand for silicones. The plant is on the Ohio River between Parkersburg and Wheeling. There are now 171 persons employed with the expected employment eventually to total about 360.

French Polyester Output

The French company, Societe Rhodiaceta, one of the largest producers of cellulose acetate and nylon in Europe has completed its plant facilities at Besancon (Jura) for the production of polyester yarn and staple. The current production is five million pounds per year. Rhodiaceta plans to double its capacity as soon as market demands increase.

Stauffer Chemical Co. has announced plans to build a new sulfuric acid plant, which will cost about two million dollars at Dominquez, Cal. Construction will begin within a month, with full scale production scheduled early in 1957. The company presently has three sulfuric plants in Cal.

James Lees and Sons Co. has announced that it has acquired land in Rabun County, near Clayton, Ga. Construction of an additional tufted carpet mill will start immediately. Operation will be carried out at the new site by a recently organized Lees' subsidiary, known as Rabun Mills, Inc. The company pointed out that the new mill would be operated in addition to its present tufted carpet facilities at Bridgeport, Pa.

Wheelco Instruments Division, Barber-Colman Co., has expanded its service facilities in the Philadelphia, Buffalo and New York areas. J. B. Moore and Edward W. Sullivan have joined the service engineering staff at their Philadelphia office. James T. Shelton, and Walter Gilmore in the same capacity have joined the company's Buffalo and New York offices.

Celanese Corp. of America has started construction of the first unit of its Charlotte Development Laboratories. Boyd & Goforth Construction Co., Inc. has undertaken the construction of the unit, which is located on a 114 acre tract, 2 miles from the company's office building. It will have 30,000 square feet of floor space.

NON-FLUID OIL
TRADE MARK REGISTERED

Will Stop Cloth Spoilage

Unchecked loss from oil spots cuts deeply into production. Seven out of ten mills eliminate this loss by using NON-FLUID OIL—the drip-less, waste-less lubricant.

Saving its own cost many times over by preventing oil spot damage—NON-FLUID OIL also saves on lubricant and application cost—by outlasting ordinary oil 3 to 5 times—saving on maintenance as well.

We recommend Grade A-#00000 NON-FLUID OIL for general lubrication of looms because it is made for this specific purpose. Write for Bulletin T-20 and free testing sample of NON-FLUID OIL.

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NON-FLUID OIL is not the name of a general class of lubricants, but is a specific product of our manufacture. So-called grease imitations of NON-FLUID OIL often prove dangerous and costly to use.

Globe DYE WORKS CO.

Orlon yarns dyed by GLOBE

Sweaters knit from butter-soft, lofty Orlon yarns, dyed by Globe, have the cashmere-like quality that delights the heart of style-and-comfort-conscious women without exception.

This is not surprising for Globe technicians had a leading role in the development of present methods of Orlon dyeing, and Globe dyers have been dyeing it continuously ever since, in production quantities.

FOR DYEING ORLON YARN
YOU CAN RELY ON GLOBE

Globe does package dyeing on tubes, skein and warp dyeing and bleaching, warp mercerizing and sizing.

Yarns we process include cotton, rayon, worsted, nylon, linen, blend and novelty yarns. Also Acrilan — Dacron — Orlon.

4500 Worth Street, Philadelphia 24, Pa., JEfferson 5-3301

The Chemstrand Corp. announced the election of Howard C. Greer as vice president of finance, and Arthur W. Lucas as treasurer. The company also announced these changes: F. William Koster as manager of control practices for production departments; Dr. Kenneth Johnson as manager of the company's Acrilan plant; Dr. Cecil W. Gayler, manager of the technical sales service department; and Robert H. Hughes, Acrilan sales specialist; Richard W. Nelson, textile technician.

Robert F. Brown, with Robert Hull and Vern Colby as assistant sales managers, was made head of the Organic Chemical Sales Department, **Emery Industries, Inc.;** G. William Boyd was made sales manager of the company's Fatty Acid Sales Department.

Wm. H. Streit

LeRoy F. Ott, president of Standard Mill Supply Co., Pawtucket, R. I since 1932, has announced his retirement and the sale of his controlling interest in the firm. William H. Streit, vice president since 1951 has purchased Mr. Ott's interest and will head the firm as president, with Harold B. Cameron vice president in charge of sales.

The **Solvay Process Division,** Allied Chemical & Dye Corp. announced these appointments in its sales department: Hugh W. Causey, assistant director of sales; Robert P. Baynard as branch manager, succeeding Mr. Causey; Robert L. Reynolds, manager of organic chemicals section; George R. Barclay, assistant to manager, special alkalies section; Ronald Lovatt, supervisor of calcium chloride section.

Responsibilities for the sale and distribution of **National Mallinson** piece goods to retail trades will be assumed by Ely & Walker. Areas previously served by Mallinson's retail sales staff will be incorporated in Ely & Walker's extensive piece goods sales coverage. Both National Mallinson and Ely & Walker are member organizations of Burington Industries.

Nopco Chemical Co. has started construction of a new plant for development work and pilot production of new and improved chemical specialties for the textile

industry. The new building will adjoin Nopco's main plant in Harrison and is being erected on a 10,000 square foot site on the Passaic River front. It is hoped that the plant will be ready for occupancy in the spring.

Columbia-Southern Chemical Corp. has set up a new district sales office at Houston, Texas. C. K. Ballard has been appointed district sales manager for the Houston district. W. J. Bramblett will serve as assistant district sales manager.

John P. Sheehy has joined the technical service and sales staff of the Glyco Products Co., Inc.

Harrison C. Givens, Jr., has been made vice president-operations of **Celanese International Corp.** The company also announces that L. G. Lovin, Jr. has been assigned to its textile sales development department to direct non-woven and batting sales.

Wm. T. Burgin

Carbide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp., announced that E. D. Murphy has been made manager, sales control, and William T. Burgin, New York district sales manager, textile fibers department.

Ira J. Yocom, Jr. was made assistant manager, U. S. Testing Co., Boston laboratories.

Dr. Daniel Frishman has been appointed director of research and development for Malden Mills, Inc.

E. Rabun Swint has been appointed manager, executive development for the Dyestuff and Chemical Division, General Aniline & Film Corp.

Erle Martin and **Carl McKelvy** were elected to the board of directors of Veeder-Root, Inc.

Walton V. Byers and **Harry B. Patterson** have been appointed sales agents for The Whitin Machine Works with headquarters in Charlotte, N. C.

R. F. Makepeace has been made representative for The Bahnson Co.'s New England territory.

Kurt Trueb has been appointed vice president in charge of weaving operations of The Schwarzenbach Huber Co.

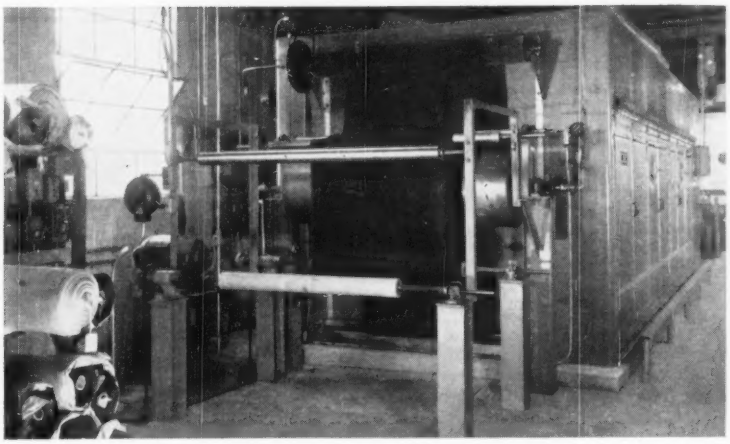
Ben Purdy has joined the sales staff of the Harry Miller Corp., Philadelphia, Pa.

THE NEW Proctor ROLLER CURER

gives 35% higher cures... Doubles Production at Oxford

through...

- **UNIFORMITY OF CURING**
- **CONTINUOUS RANGE OPERATION**
- **CONTROL OF FABRIC TENSION WHILE RUNNING**
- **ELIMINATION OF RERUNS**



The installation of a new Proctor Roller Curer together with rearrangement of existing facilities, has enabled the Oxford Textile Finishing Company, Oxford, N.J., to increase production from 50,000 to 105,000 yards per day. At Oxford, the new curer achieves 85 to 95% cures.

NEW DESIGN FEATURES

New Proctor W construction reduces installation costs, provides efficient, air tight and well insulated housing—smooth, easy to clean surfaces. Uniform air distribution promotes uniform curing without shading. Variable speed motors power each alternate top roller.

Tension can be adjusted from minimum to maximum while the machine is in operation according to the requirements of the fabric being cured. Unique roll drive permits Roller Curer being placed in range operation with no change in present drive arrangement.

To find out about the complete "Oxford Story" as well as the advantages of a Proctor Roller Curer in your mill, write for latest information bulletin #412.

PROCTOR EQUIPMENT FOR THE TEXTILE FIELD

AUTOMATIC BLENDING SYSTEMS • WEIGHING FEEDS • PICKERS • SHREDDERS • BALE BREAKERS • SYNTHETIC CARDS • GARNETTS • DRYERS FOR FIBROUS MATERIAL • YARN DRYERS • HOT AIR SLASHER DRYERS • CLOTH CARBONIZERS • ROLLER DRYERS AND CURERS • LOOP AGERS FOR PRINT GOODS • TENTER HOUSINGS • OPEN-WIDTH BLEACH SYSTEMS FOR WOVEN FABRICS • MULTIPASS AIRLAY DRYERS • NYLON SETTING EQUIPMENT • CON-O-MATIC WASHERS • CONTINUOUS BLEACH SYSTEMS FOR TUBULAR KNITS • EQUIPMENT FOR PRODUCING "REDMANIZED"® SHRUNK-TO-FIT FABRICS • CARPET DRYERS

Proctor **PROCTOR & SCHWARTZ, INC.**

Philadelphia 20, Pa.

Manufacturers of Textile Machinery and Industrial Drying Equipment

U. S. MAN-MADE FIBER PRICES

This schedule lists the prices of yarns, staple and tow as reported by the producers in March, 1956. All prices are given as subject to change without notice.

RAYON FILAMENT YARN

American Bemberg

Current Prices

Effective February 15, 1956

Regular Production Reel Spun Yarn

Den/Fil	No Twist Skeins	Twisted* Skeins & Cones	8½ Turns	High Twist Skeins & Cones 12 or 15 Turns	18 Turns
40/30	$1.49	$1.95	....	....	$2.08
50/36	1.24	1.50	....	....	1.72
65/45	1.14	1.30	....	$1.53	1.58
75/60**	1.04	1.18	....	1.41 $1.41	1.49
100/74**	.95	1.08	....	1.33 1.33	1.44
125/60	.94	1.05	$1.09	....	....
150/120	.93	1.02	1.12	1.27	....
300/225		.95	....	1.08	....

* Twisted includes twists up to 6 turns on 40 and 50 denier, and up to 5 turns on heavier deniers.
** Spun Dyed Black 15¢ per lb. extra.

"44" HH Spool Spun Yarn

Den/Fil	No Twist Tubes	No Twist Beams	5 Turn Beams	5 Turn Cones	12 Turn Beams	12 Turn Skeins & Cones	15 Turn Skeins & Cones
40/30	$1.35	$1.35	....	....	....	....	....
50/36	1.05	1.05	....	....	....	....	....
65/45	1.05	....	....	....	....	$1.42	....
75/45**	.97	.97	$1.08	$1.08	$1.31	1.31	$1.39
75/54	.97	.97	1.08	1.08	....	....	....
100/60**	.89	.89	1.03	1.03	1.23	1.23	1.23
125/60	.84	.84	.99	.99	....	....	....
150/90***	.77	.77	.81	.81	....	1.15	1.15
150/120	.81	....	....	.93	....	....	....

** Bemberg Solution Dyed yarns are spun in 75/45 and 100/60 only. Black 15¢ per lb. extra; all other colors 35¢ per lb. extra.
*** Spun Dyed Black 15¢ per lb. extra.

Nub-Lite (Short Nubbi)

Code	Den/Fil	2½ Twist Cones	5 Twist Cones
1516	150/90	....	$1.35
1517*	150/90	....	1.35
2000	200/120	....	.96
2025**	200/120	....	.96
3000	300/180	$1.00	....
4000	400/224	1.00	....
6000	600/360	.98	....
8000	800/450	.98	....

* Code 1517 can be run in warp or filling.
** Code 2025-Softer than 2000.

Terms: Net 30 days, f.o.b. shipping point. Minimum freight allowed to consignee's nearest freight station east of the Mississippi River. To points west of the Mississippi River minimum freight allowed to Memphis, Tennessee. Goods after shipment shall be at buyer's risk. Merchandise transported in seller's own trucks or those of its affiliates is sold f.o.b. delivery point.

American Enka Corp.

Current Prices

Standard Quality Yarns

Standard Quality Rayon Yarns

A. Natural:

Den/Fil.	Luster	Turns		Skeins: Weaving Cones	Beams	Long	Short	Cakes	3 Lb. Knotless Cakes	Knitting Cones
50/18	E	5	S							1.51
75/10	B	3	S&Z					1.03		
75/18	E	4	S							1.17
75/30	B	4	S&Z	1.12	1.12			1.03		1.12
75/30	B	8	S	1.17			1.32			1.17
75/45	P,E	2.5, 4, 5	S&Z	1.12	1.12	1.18		1.03		1.12
75/60	P	3	Z	1.17						
100/14	B	3	S&Z					.91		
100/40	B,E	12	S							1.22
100/40	B,P,E	4, 5	S&Z							.99
100/40,60	B,P	2.5	S&Z	.99	.99	1.03	1.07	.91		.99
100/60	E	2.5	S	1.01	1.01			.93		
125/40	E	3	Z							.91
150/40	B,P,E	2.1,3	S&Z	.86	.86	.89	.94	.81	.82	.85
150/40	B,E	5	S	.86		.89	.94			
150/40	B,E	8	S&Z	.92		.95	1.00			
150/90	B,E	2.1	S&Z	.87	.87			.82		
200/40	P	3	Z							.79
250/60	P,E	2.4	Z							.72
300/50	B,E	3	S	.70	.70					
300/60	B,P,E	2.1	S&Z	.70	.70		.73	.68	.69	.70
300/60	B	3.5	S	.70	.70			.68		
300/60	B	4.3	S	.73	.73			.71		
300/60	B	7	S	.80						
300/40, 120 H.T.	B	2.5, 3, 4	S	.72	.72					
450/80	B	3	S	.67	.67			.65	.66	
600/80,120	B,E	3	S	.66	.66			.64	.65	
900/120	B	3.4	S	.65				.63	.64	
900/120 H.T.	B	3.6	S	.67				.65	.66	

B—Briglo, P—Perlglo (semi-dull), E—Englo (dull), H.T.—High Tenacity.
B. Tinted Yarns: 5¢ additional per lb.

"Jetspun" Colored Yarns

Den/Fil.	Tenacity	Turns	Weaving Cones	Beams	Cakes	Colors
100/40	Regular	2.5S	1.34	1.34	....	All
100/60	Regular	4 S&Z	....	....	1.26	All
150/40	Regular	2.1S	1.21	1.21	....	All
300/40	Regular	3.4S	1.05	....	....	All
450/80	Regular	3.0S	1.02	....	....	All
600/80	Regular	3.4S	1.01	....	....	All
900/120	Regular	3.4S	1.00	....	....	All
300/40	High	3.4S	1.07	....	....	All
600/80	High	3.4S	1.03	....	....	All
900/120	High	3.4S	1.02	1.02	....	All

Terms: Net 30 days F.O.B. Enka, North Carolina or Lowland, Tennessee. Minimum common carrier transportation charges prepaid to first destination on or east of the Mississippi River.

American Viscose Corp.

Effective January 23, 1956

Graded Yarns

Denier	Filament	Type	Short Skeins	Long Skeins	All Cones Beams Tubes	All Cones Cakes
50	20	Bright & Dull	$	$1.54	$1.51	$1.40
60	10	Bright	....	....	1.36	1.25
75	10-30	Bright	1.19	1.15	1.12	1.03
75	30	Dull	....	....	1.12	1.03
100	14-40	Bright	1.07	1.02	.99	.91
100	60	Dull	....	....	1.01	.93
150	24-40-60	Bright & Semi-Dull	.94	.89	.86	.81
150	40	Dull	....	....	.86	.81
150	90	Dull	....	....	.87	.82
200	10-44	Bright	.87	.82	.79	.75
250	60	Semi-Dull & Dull	.79	.75	.72	.70
300	44	Bright & Dull	.76	.73	.70	.68
300	234	Dull	....	....	.72	.70
450	100	Bright	....	.69	.67	.65
600	100	Bright	....	.68	.66	.64
900	60-100-150	Bright	....	.67	.65	.63
1200	75	Bright	....	.64	.62	....
2700	150	Bright	....	.67	.65	....

Extra Turns Per Inch

75	30	Bright 6-Turns	$1.31	$1.27	$1.24	$ ....
100	40	Bright 6-Turns	1.19	1.14	1.11	1.03
150	40	Bright 6-Turns	1.04	.99	.96	.91
300	15	Bright 5-Turns	....	....	.75	....
300	44	Bright 6-Turns	....	.83	.80	.78
600	30	Bright 5 Turns	....	.73	.71	.69

Rayflex Yarns

150	60	Rayflex	$	$	$ .89	$ .84
300	120	Rayflex	....	....	.72	.70
450	120	Rayflex	....	....	.69	.67
600	234	Rayflex	....	....	.68	.66
900	350	Rayflex	....	.69	.67	.65

Thick and Thin Yarns

150	40	Bright & Dull	....	....	1.10	....
150	90	Bright & Dull	....	....	1.10	....
200	75	Bright & Dull	....	....	1.02	....
300	120	Bright & Dull	....	....	.92	....
450	100	Bright & Dull	....	....	.89	....
490	120	Bright & Dull	....	....	.92	....
900	350	Dull	....	....	.97	....
920	120	Bright & Dull	....	....	.97	....

Colorspun Yarns

Currently producing 150/30 and 300/60 regular tenacity and 900/234 Rayflex at premiums of $.35 per pound.

Ralph D. Padgett recently completed a three-week tour of Europe for Roberts Co., Sanford, N. C. in his capacity as manager of sales-service.

Rupert Melton and **Bernard C. Houston** have joined the Pneumafil Corp. as product manager, sales division, and service engineer, respectively.

Joseph A. Englert has been made assistant product director of the Chix Baby Products Division, Chicopee Mills.

Herbert I. Segal was elected president of the Van Norman Industries, Inc., Springfield, Mass.

Frank Anderson has been appointed technical representative for Moretex Chemical Products in the N. C.-Va. area.

Robert S. Pennock

Robert S. Pennock has joined Universal Winding Co. as vice president in charge of domestic sales succeeding Winthrop S. Warren, who retired as of January 1.

Alfred McGregor has been made a supervisor in Metro-Atlantic's Dyestuff Application Laboratory.

L. Robert Clinton has been made purchasing agent for National Vulcanized Fibre Co., Wilmington, Del.

William F. Luther has announced his resignation as director of research, Dixie Mercerizing Co., in order to become technical director of the Marler Chemical Co., Cleveland, Tenn.

John Davenport has moved his residence to Moorestown, N. J. in order to be closer to the mills he contacts for Foster Machine Co. as sales representative. The company also announced that **John A. Moore** has moved to their Charlotte, N. C. office.

American Enka Corp. has announced new responsibilities in the treasurer's office for Traynham Houston and Arthur E. Eve, Jr.

Owens-Corning Fiberglas Corp. has appointed Harrison C. Blankmeyer as manager of their research laboratories, Textile Products Division; Dr. A. C. Siefert as director of research; and Dr. L. P. Biefeld as technical director, Research Division, Newark, Ohio.

Death

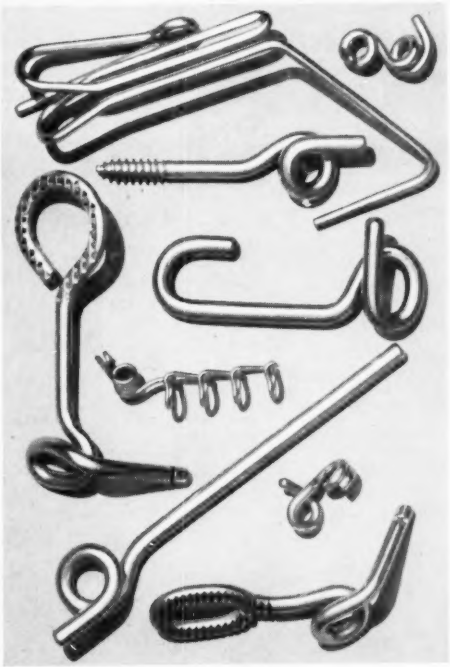
Alfred A. Halden, executive vice president and director of National Starch Products, Inc. on March 19, 1956. Mr. Halden was 61.

WHAT DOES THE GREAT WALL OF CHINA HAVE TO DO WITH . . .

TEXTILE HARD CHROMIUM PLATING?

The Great Wall of China—

About 2000 years ago the Chinese erected one of the most famous protective barriers known to mankind . . . the fabulous Great Wall wound its way along natural boundary lines to attain the final amazing length of 1400 miles. It is considered one of the world's outstanding landmarks, for after twenty weatherbeaten centuries, portions of it remain intact to this day — dramatic testimony of the value of good workmanship.



WE, TOO, pride ourselves in the workmanship that goes into our product. WALHARD Chromium Plating will give your parts longer-lasting protection — save you money in maintenance and down-time costs.

You are paying for both *quality* and *service* regardless of what you are getting. It costs no more to have the very best hard chromium plating—it will last longer and save you money.

Be sure you are getting quality. It costs no more and lasts longer.

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The leading name in textile hard chromium plating

WALTON and LONSBURY

79 NORTH AVENUE — ATTLEBORO, MASSACHUSETTS

Viscose Filament Yarns

The following deposit charges are made on invoices:

Metal Section Beams	$170.00 each
Wooden Section Beams	50.00 each
Wooden Section Beam Crates	30.00 each
Metal Section Beam Racks	75.00 each
Metal Tricot Spools—14" flange	30.00 each
21" flange	60.00 each
32" flange	150.00 each
Metal Tricot Spool Racks—14" flange	135.00 each
21" flange	100.00 each
32" flange	75.00 each
Wooden Spool Crates	20.00 each
Cloth Cake Covers	.05 each

Same to be credited upon return in good condition—freight collect.
Terms: Net 30 days.

Celanese Corp. of America

Current Prices
Effective January 24, 1956

Den. Fil. Twist	Beams	Cones	Cakes	Non Shrunk Tubes
#49 and #14 Production				
75/30/3 Bright		$1.06	$.98	....
100/40/3 Bright	$.93	.91	.86	....
100/40/5 Bright	....	.97	.92	....
100/60/3 Bright	....	.92	.87	....
125/40/2Z Bright	.89	.87	....	....
150/40/3 Bright	.84	.80	.75	....
150/40/2Z Bright	.82	....	....	....
150/40/5 Bright	....	.86	.81	....
150/40/8 Bright	....	.92	.87	....
150/40/0 Bright (Non Shrunk)	....	.66	....	....
300/50/3 Bright	.69	.68	.66	....
300/50/0 Bright (Non Shrunk)	....	.60	....	....
#20 Production				
150/40/3 Bright	.82	.78	.73	$.72
150/40/0 Bright (Non Shrunk)	....	.66	....	....
150/40/2Z Bright	.80	....	....	....
300/50/3 Bright	.69	.68	.66	....
300/50/0 Bright (Non Shrunk)	....	.60	....	....
#20 Production				
100/40/3 Dull	....	.91	.86	....
100/60/2Z Dull	.95	....	....	....
100/60/0 Dull	....	.88	....	....
100/60/5 Dull	.99	.97	.92	....
150/40/3 Dull	.82	.78	.73	.72
150/40/0 Dull (Non Shrunk)	....	.66	....	....
150/90/3 Dull	....	.85	.80	....
250/60/0 Dull (Non Shrunk)	....	.64	....	....
250/60/3 Dull	....	.72	....	.67
#52 Thick & Thin Rayon				
150/60/3 Bright	....	1.10	....	....
450/120/3 Bright	....	.89	....	....

Terms: Net 30 days. Prices per pound F.O.B. shipping point, lowest transportation allowed to destination in U.S.A. east of the Mississippi River.
Prices subject to change without notice.
All previous prices withdrawn.
Note: Prices on unlisted items can be obtained upon request.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.
Current Prices
Effective January 23, 1956

Bright and Dull

Den.	Fil.	Turns/Inch Up to		(A) Cones, Beams, Tubes	Skeins	Cakes
40	20	3	Textile "Cordura"	$1.90	1.90	$1.85
50	20	3		1.58	1.58	
50	20	3	Textile "Cordura"	1.60	1.60	1.55
50	35	3	Textile "Cordura"	1.65	1.65	1.60
75	10	3		1.12	1.15	1.03
75	15	3		1.12	1.15	1.03
75	30	3		1.12	1.15	1.03
100	15	3		.99	1.02	.91
100	40	3		.99	1.02	.91
100	60	3	Bright	.99	1.02	.91
100	60	3	Dull	1.01	1.04	.93
125	50	3		.91	.93	.85
150	40	3		.86	.87	.81
150	60	3		.86		
150	60	3	Textile "Cordura"	.87	.88	.82
150	90	3	Dull	.87	.88	.82
150	100	3	Dull	.87	.88	.82
200	35	3		.79	.81	.75
300	20	3		.70	.73	.68
300	50	3.5		.70	.73	.68
300	120	3	Textile "Cordura"	.71	.74	.69
450	72	3		.67	.69	.65
600	96	3		.66	.68	.64
600	240	3	Textile "Cordura"	.67	.69	.65
900	50	3		.65	.67	.63
900	144	3		.65	.67	.63
1165	480	3	Textile "Cordura"	.65	.65	.62
1800	100	3		.65		
2700	150	3		.65		
5400	300	3		.72		

Thick and Thin

150	90	3	#7	1.10	1.11	1.10
150	90	3	#19	1.10	1.11	1.10
200	80	3	#7	1.02	1.03	1.02
200	90	3	#19	1.02	1.03	1.02
450	100	3	#7	.89	.90	.89
1100	240	3	#50	1.32		1.32
2200	480	3	#50	1.14		1.14

Fiber E

300	50	2½	.88
900	50	2½	.83
900	90	2½	.83
2700	150	2½	.88
2700	270	2½	.88
5400	540	2½	.88

(A) 2¢/lb. additional for cones less than 3# and tubes less than 2#.
Terms: Net 30 days.
Prices are quoted F.O.B. Shipping Point—lowest cost of transportation allowed or prepaid. To points west of the Mississippi lowest cost of transportation allowed or prepaid to Mississippi River crossing.

Industrial Rayon Corp.

Effective January 27, 1956

Bleached Yarns

Denier	Filament	Turns per In.	Type	2.8 Lb. Cones	4.4 Lb. Cones	Beams	2.2 Lb. Tubes	4.4 Lb. Tubes
100	40	2.5 "S"	Bright	.99		.99		
150	40	2.5 "S"	Bright	.86		.86		
150	40	2.5 "S"	Luster #4	.86		.86		
150	40	2.5 "S"	Bright intermediate strength	.87				
200	20	2.5 "S"	Bright	.79				
200	40	2.5 "S"	Bright	.79				
300	44	2.5 "S"	Bright	.70		.70		
300	80	2.5 "S"	Bright	.70		.70		
300	80	2.5 "S"	Luster #4	.70		.70		
300	80	2.5 "S"	Bright extra strong	.72		.72		
450	60	2.0 "S"	Bright		.67	.67		
600	90	1.5 "S"	Bright		.66	.66	.66	.66
900	50	2.0 "S"	Bright		.65	.65	.65	.65
900	150	1.5 "S"	Bright		.65	.65	.65	.65

Luster #4 is semi-dull.
Standard skein lengths at 2,100 yards for 900 denier, 3,200 yards for 600 denier, 4,400 yards for 450 denier, and 6,500 yards for 300 denier —all at 2¢ per pound over cone prices.
900 denier 6 turns—Plus 8¢ for cones.
Terms: Net 30 days f.o.b. point of shipment; title to pass to buyer on delivery of goods to carrier. Domestic transportation charges allowed at lowest published rate to all points east of the Mississippi River.

North American Rayon Corp.

Current Prices

First Quality Yarns	Den/Fil	Twist	Cones: Knitting*, Jacquard and Velvet Cones	Cones: No Twist Knitting Cones	Cones: Beams, Tubes** and Weaving Cones	Untreated Cakes
	75/30	3.5			$1.12	$1.03
	75/30	7			1.25	
	75/30	15			1.32	
Normal	75/30	20			1.35	
Strength Yarns	100/40/60 Brt.	3.5			.99	.91
NARCO	100/40/60	12			1.17	
	125/52	3	$.91		.91	.85
	125/52	10			1.08	
	125/60	3			.92	
	150/42	3	.85		.86	.81
	150/42	0		$.66		
	150/60	3			.86	
	135/52	3			.90	
	150/75	3			.86	
	300/75	3	.70		.70	
	300/75	0		.60		
	300/75	6			.80	
	600/98	3	.66		.66	
	900/46	2.5	.65		.65	
	1800/92	2.5	.65		.65	
Semi-High	300/75 Brt.	6			.81	
Strength Yarns	300/75	3			.71	
Hi-NARCO						

* Oiled Cones .01 per pound extra for Graded Yarns only.
** 1 lb. tubes $.02 per pound extra for Graded Yarns only.
Terms: Net 30 days f.o.b. shipping point. Minimum freight allowed to consignee's nearest freight station East of the Mississippi River. To points West of the Mississippi River minimum freight to Memphis, Tenn. allowed. Goods after shipment shall be at buyer's risk. Merchandise transported in seller's own trucks or those of its affiliates if sold f.o.b. delivery point.

RAYON HIGH TENACITY YARN and FABRIC

American Enka Corp.

Effective January 26, 1956

Tempra (High Tenacity)

Denier	Elongation	Beams & Cones
1100/480	Low	$.62
1230/480	High	.62
1650/720	Low	.58
1820/720	High	.58
2200/960	High & Low	.58

Suprenka (Extra High Tenacity)

1650/720	Low	.61
1900/720	High	.61
2200/960	Low	.60

* Beams Only.
Terms: Net 30 days, f.o.b. Enka, North Carolina, or Lowland Tennessee; minimum freight allowed to first destination east of the Mississippi River.

WHETHER YOU SELL { Dyes / Finishes / Bleaches / Dyeing and Finishing Equipment.

The Perkin Centennial will be FEATURED in our AUGUST Issue. This issue offers an EXCLUSIVE market at the lowest possible RATE to you.

Specially prepared, exclusive editorial material on dyeing and finishing will jam-pack this issue. It will be dedicated to the Perkin Memorial Celebration to be held this year as part of the annual convention of the American Association of Textile Chemists & Colorists scheduled for the week of September 10.

MTM's big bonus Dyeing & Finishing Issue will reach subscribers during the first week of August—just when their interest in the Perkin Centennial is reaching its climax —just when they are getting ready to take off to the Waldorf Astoria in New York where the Centennial and the AATCC Convention will be held.

Your advertisement will be read by thousands of practical dyers and finishers at a time when they are thinking of trying new things, new dyes, new finishing chemicals, new machines and auxiliary equipment.

NOW'S THE TIME TO BOOK SPACE IN MTM'S AUGUST DYEING & FINISHING BONUS ISSUE. COPY MUST BE IN OUR HANDS NO LATER THAN JULY 1.

DON'T WAIT — YOU MAY BE TOO LATE

Write or telephone us to place your space order.

MODERN TEXTILES MAGAZINE

303 Fifth Ave., New York 16, N. Y. MUrray Hill 4-0455

Cocker Expands Lines

Cocker Machine & Foundry Co., Gastonia, N. C. has announced the addition of three more textile machinery lines. According to president John Cocker III, the company

John Cocker III

will manufacture, sell and service Sucker hot air dryers in connection with Cocker slasher heads and size boxes. Cocker will also sell and service A. Monforts line of cloth finishing equipment on an agency basis, and will manufacture but not sell Thies dyeing equipment. Thies sales will be handled by Texplant Corp., Stamford, Conn.

Greenwood Mills, Inc. has announced the location of its New York office at 111 West 40th Street, where a new building is being erected. It is expected that the new building will be ready for occupancy in spring, 1957.

NOW
A "COMPLETE PACKAGE"

THE MODERN WAY TO BUY
THROWN, NATURAL OR DYED
FILAMENT YARNS

RAYON • NYLON • DACRON • ORLON

Modern standards of production efficiency and quality demand modern methods. The "complete package" — a perfectly thrown, natural or dyed package of filament yarn — prepared to your custom requirements by experts may be the ideal solution to your yarn problems.

As specialists in the exacting job of dyeing and throwing modern yarns since 1922, Hoffner is the logical choice for "complete package" service.

Why not consult us about this new way of streamlining your production and improving quality?

Hoffner RAYON COMPANY

"For that added touch of beauty"

DYERS and THROWSTERS of MODERN YARNS

General Offices at Belgrade & Ontario Streets, Philadelphia 34, Pennsylvania

Plants at Philadelphia and Quakertown, Pennsylvania

SALES REPRESENTATIVES: David F. Swain & Company, 105 W. Adams Street, Chicago 3, Ill. — Shannonhouse & Wetzell, Johnston Building, Charlotte 2, N. C.

American Viscose Corp.

Effective April 2, 1956

Super Rayflex

Denier	Filament	Twist	Beams	Cones
1650 (Type 110)	980	0	$.66	$.66
1650 (Type 200-300)	980	4.1Z	.64	....

Tire Yarn

1100	490	2.5Z	.62	....
1650	980	0	.58	.58
1650	980	3.2Z	.58	....
2200	980	0	.58	.58

High Strength

1150	490	2.5Z	.62	.62
1230	490	3.6Z	.62	.62
1650	980	3.5Z	.58	.58
1875	980	3.6Z	.58	.58

Super Rayflex, Tire Yarn and High Strength yarns are sold "Not Guaranteed for Dyeing."

Tire Fabric

1100/490/2	.72
2200/980/2	.665

Above prices based on 80% minimum Carcass, 15% maximum Top Ply, 5% maximum Breaker.

1650/980/2

* Production Factor

525	Open	Carcass	.665
300	490	Top Ply	.675
115	275**	Breaker	.70

* Determine by dividing total ends by picks.

** Orders limited to 5% total 1650 fabric booked for any given period.

SUPER RAYFLEX FABRIC TYPE 110
Add .08 to above tire fabric prices.

SUPER RAYFLEX FABRIC TYPE 200-300
Add .06 to above tire fabric prices.

Beams	$55.00 each
Crates (Metal)	75.00 each
Fabric Shell Rolls	3.50 each

Same to be credited upon return in good condition—freight collect.
Terms: Net 30 days.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

"Super Cordura"
(all packages)

1100	480	2	$.76
1250	480	2	.76
1650	720	2	.69
1900	720	2	.69
2200	960	2	.68
2450	960	2	.68

Beams containing ends of direct dyed yarn $3.30 per end extra.
Terms: Net 30 days.
Prices are quoted F.O.B. shipping point—lowest cost of transportation allowed or prepaid. To points west of the Mississippi lowest cost of transportation allowed or prepaid to the Mississippi River crossing.

Industrial Rayon Corp.

Effective January 27, 1956

Unbleached Bright High Tenacity Yarns

Den.	Fil.	Turns Per In.	4.4 Lb. Cones	Beams	2.2 Lb. Tubes	4.4 Lb. Tubes
1100	480	1.5 "Z"	.62	.62	.62	.62
1650	720	1.5 "Z"	.58		.58	.58

Terms: Net 30 days f.o.b. point of shipment; title to pass to buyer on delivery of goods to carrier. Domestic transportation charges allowed at lowest published rate to all points east of the Mississippi River.

North American Rayon Corp.

High-Strength Yarns—SUPER-NARCO		Twist	Cones	Beams
1650	720	3Z		$.61
1850	720	3Z	$.61	
Super High Strength Yarns—				
1650	720	1.5Z	.64	.64

Terms: Net 30 days, f.o.b. shipping point. Minimum freight allowed to consignee's nearest freight station East of the Mississippi River. To points West of the Mississippi River minimum freight to Memphis, Tenn. allowed. Goods after shipment shall be at buyer's risk. Merchandise transported in seller's own trucks or those of its affiliates if sold f.o.b delivery point.

ACETATE FILAMENT YARN

American Viscose Corp.

Current Prices

Effective December 20, 1955

Bright and Dull

* Intermediate Twist

Denier & Filaments	Cones & 4-6 Lb. Tubes	Twister Tubes	Warps	Spinning Cones	Twist Warps
55/14	$.99	$.97	$1.00	$.93	$.94
75/20	.95	.93	.96	.89	.90
100/28	.91	.89	.92	.85	.86
120/32	.82	.80	.83	.76	.77
150/41	.74	.73	.75	.69	.70
200/54	.70	.68	.71	.66	.67
300/80	.66	.64	.67	.62	.63

* Standard Twist 2¢ additional.

Celanese Corp. of America

Current Prices

Effective December 19, 1955

Bright and Dull

Denier and Filaments	Intermediate Twist: 4 & 6-Lb Cones	Beams	4 & 6-TM Tubes	4-Pound Cheeses	Spinning Twist: Cones	Beams	O Twist Tubes
45/13	$1.12	$1.13	$	$	$	$1.07	$ ....
55/15	.99	1.00	....	....	.93	.94	.875
75/20	.95	.96	.93	....	.89	.90	.79
75/50	.97	.98	.95	....	....	....	.84
100/26-40	.91	.92	.89	....	.85	.86	.77
120/40	.82	.83	.81	....	.76	.77	....
150/40	.74	.75	.74	.74	.69	.70	.66
200/52	.70	.71	.70	....	.66	.67	....
300/80	.66	.67	.66	....	.62	.63	.60
450/120	.64	.65	.64	....	.60	.61	....
600/160	.62	.63	.62	....	....	....	....
900/80-240	.60	.61	.60	....	....	....	.58

3 to 5 Turns on Cones or Beams ... $.02 Additional
150 Denier 12 TM Tubes ... .73
55/0/15Dull Tricot Beams ... .935
2-Pound Cheeses ... .01 Less Than 4-Pound Cheeses
2-BU and 4-BU Tubes ... Same Price as 4 and 6-Lb. Cones

Terms: Net 30 days. Prices per pound F.O.B. shipping point, lowest transportation allowed to destination in U.S.A. east of the Mississippi River.
Prices subject to change without notice.
All previous prices withdrawn.
Note: Prices on unlisted items can be obtained upon request.

Celaperm Filament Yarn Prices

Denier and Filaments	Intermediate Twist: 4 & 6-Lb. Cones	Beams	Spinning Twist: Cones	Beams
55/15	$1.37	$1.38	$1.31	$1.32
75/20	1.34	1.35	1.28	1.29
100/26	1.28	1.29	1.22	1.23
120/40	1.19	1.20	1.13	1.14
150/40	1.11	1.12	1.06	1.07
200/52	1.05	1.06	1.01	1.02
300/80	1.01	1.02	.97	.98
450/120	.99	1.00	.95	.96
600/160	.97	.98	....	....
900/80	.94	....	....	....

3 to 5 Turns on Cones or Beams — $.02 Additional

Effective March 11, 1955

Celaperm Black Yarn Prices

Denier and Filaments	Intermediate Twist: 4 & 6-Lb. Cones	Beams	Spinning Twist: Cones	Beams
55/15	$1.17	$1.18	$1.11	$1.12
75/20	1.14	1.15	1.08	1.09
100/26	1.08	1.09	1.02	1.03
120/40	.99	1.00	.93	.94
150/40	.91	.92	.86	.87
200/52	.85	.86	.81	.82
300/80	.81	.82	.77	.78
450/120	.79	.80	.75	.76
600/160	.77	.78	....	....
900/80	.74	....	....	....

3 to 5 Turns on Cones or Beams — $.02 Additional

Terms: Net 30 days. Prices per pound F.O.B. shipping point, lowest transportation allowed to destination in U.S.A. east of the Mississippi River.
Prices subject to change without notice.
All previous prices withdrawn.
Note: Prices on unlisted items can be obtained upon request.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

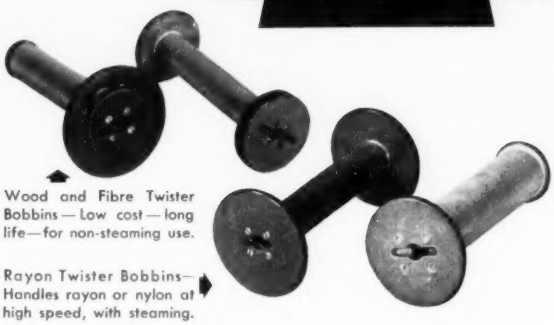
Acetate

Denier & Filament	Intermediate Twist: 2 & 4 Lb. 3/8" Tubes	4-6 Lb. Twist Tubes	Cones	Beams	Low Twist: Cones	Beams	Zero Twist: Tubes	Beams
45/13/24			1.12	1.13		1.07	1.05	
55/18/24			.99	1.00		.94	.875	.935
75/24		.93	.95	.96	.89	.90	.79	.89
75/50		.95	.97	.98			.84	
100/32		.89	.91	.92	.85	.86	.77	
100/66			.93	.94			.79	
120/40/50		.81	.82	.83	.76	.77	.73	
150/16			.78	.79			.69	
150/40		.74	.74	.75	.69	.70	.66	.69
200/60		.70	.70	.71	.66	.67	.65	
240/80			.68					
300/40/80	.66	.66	.66	.67	.62	.63	.60	.62
450/120	.64	.64	.64	.65	.60	.61		
600/80/160	.62	.62	.62	.63	.59	.60		
800/40								
900/44/70/240	.60	.60	.60	.61	.59	.60	.58	
1800/88	.61	.61	.61	.62	.60	.61	.59	
2700/132/210	.61	.61	.61	.62	.60	.61		
3200/160/210	.61		.61	.62				
5400/420					.60	.61		
6000/744								
12000/1488					.65	.66		

A. 1# 3/8" Tubes—add .02 to 2 & 4 lb. 3/8" Tubes Price.
B. Regular Twist (3 thru 5 t.p.i.)—add .02 to Intermediate Twist Price.
C. 2 lb. Twisted Tubes—.01 less than 4 & 6 lb. Twisted Tubes on 150-200-300 Denier Intermediate Twist.

Lestershire Bobbins by NATIONAL

first choice of economy-wise mill men



Wood and Fibre Twister Bobbins — Low cost — long life—for non-steaming use.

Rayon Twister Bobbins—Handles rayon or nylon at high speed, with steaming.

What's your production headache—newly discovered synthetic yarns, larger "packages," higher rotating speeds? You'll find a remedy in Lestershire Bobbins by National.

Lestershire Division of National aims its research, design and fabricating skills pointblank at your specific bobbin trouble. Bobbin improvement is a fulltime job with National—the Lestershire line has grown with the industry's requirements. So you're sure of getting just the bobbins you need —to suit almost any spindle, speed or yarn in use today.

You'll get real economy too. Lestershire bobbins and spindles are realistically priced. Prompt service from nearby supply houses means additional savings. And Lestershire's rigid quality control assures long, trouble-free bobbin and spindle life.

Get in touch with your nearest National Office or representative—or write us at Wilmington, Delaware. Southern Bobbin Representatives: Odell Mill Supply Co., Greensboro, N. C.; Greenville Textile Supply Co., Greenville, S. C.

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VULCANIZED FIBRE CO.
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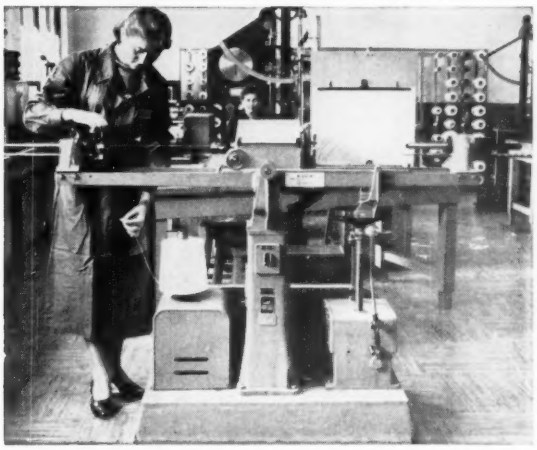
ALSO MANUFACTURERS OF NATIONAL VULCANIZED FIBRE, PHENOLITE LAMINATED PLASTIC, PEERLESS INSULATION, VUL-COT WASTEBASKETS
NEW DIMENSIONS IN DESIGN AND SERVICE TO THE TEXTILE INDUSTRY

– and in Italy



SCOTT TESTERS* AT PIRELLI S.p.A., Milan, Italy

The Scott IP-4 Incline-plane Serigraph shown is installed in the Textile Laboratory of the Central Rubber Research Laboratories at the above firm. Their quality control program includes fatigue as well as tensile elongation testing of their tyre cord production. The resultant "picturized" evaluations are in conformity with ASTM and ISO specifications and are universally understood and accepted as standard. The world status of Scott equipment is attested by the fact that today

nearly 40% are shipped export.

Outline your testing problem and let us assist with literature and counsel.

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Sales:
JOHN KLINCK
304 West Forest Avenue
North Augusta, S. C.

REPRESENTATIVES IN FOREIGN COUNTRIES

Standard of SCOTT the World

Color-Sealed

Denier	Intermediate Twist Twisted Tubes 2 Lb.	4 & 6 Lb.	Cones	Beams	Low Twist Cones	Beams	Zero Twist Tubes	Beams
55/18-24			1.37	1.38	1.31	1.32	1.245	1.315
75/24			1.34	1.35	1.28	1.29	1.18	1.28
100/32	1.26	1.26	1.28	1.29	1.22	1.23	1.14	
150/40	1.10	1.11	1.11	1.12	1.06	1.07	1.03	1.06
200/60	1.04	1.05	1.05	1.06	1.01	1.02	1.00	
300/40-80	1.00	1.01	1.01	1.02	.97	.98	.95	.97

A. Regular Twist—add .02 to intermediate twist prices.

Black

Denier	Intermediate Twist 2 & 4 Lb. ⅝" Twisted Tubes	4 & 6 Lb. Twisted Tubes	Cones	Beams	Low Twist Cones	Beams	Zero Twist Tubes	Beams
55/18-24			1.17	1.18	1.11	1.12	1.045	1.115
75/24		1.12	1.14	1.15	1.08	1.09	.98	1.08
100/32		1.06	1.08	1.09	1.02	1.03	.94	
150/40		.91	.91	.92	.86	.87	.83	.86
200/60		.85	.85	.86	.81	.82	.80	
300/40-80	.81	.81	.81	.82	.77	.78	.75	.77
450/120	.79		.79	.80	.75	.76		
600/80-160	.77		.77		.73			
800/40								
900/44-70-240								
1800/88	.74		.74		.73			
2700/132-210	.74		.74		.73			
3000/210								
3200/160	.74		.74					
5400/420					.73			
6000/744								
12000/1488					.78			

A. Regular Twist (3 thru 5 t.p.i.)—add .02 in intermediate twist prices.

B. 2 lb. Twisted Tubes are the same as 4 & 6 lb. except on 150-200 and 300 denier intermediate twist where the price is .01 less.

C. 1 lb. ⅝" Tubes—add .02 to 2 and 4 lb. ⅝" Tubes.

Terms: Net 30 Days. Domestic Prices are quoted F.O.B. Shipping Point—lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation allowed or prepaid to Mississippi River crossing.

Price subject to change without notice.

Eastman Chemical Products, Inc.

Tennessee Eastman Co.

Effective December 19, 1955

Estron Yarn, Bright or Dull — White

Denier & Filament	Regular Twist Cones	Intermediate Twist Cones	Tubes	Beams	Low Twist Cones	Beams	Tubes Twist Zero
55/13	$1.01	$0.99	$0.97	$1.00	$0.93	$0.94	$0.87½
75/19	.97	.95	.93	.96	.89	.90	.79
75/49	.99	.97	.95	.98			
100/25	.93	.91	.89	.92	.85	.86	.77
120/30	.86	.84	.82	.85	.78	.79	
150/38	.76	.74		.75	.69	.70	.66
200/50	.72	.70		.71	.66	.67	
300/75	.68	.66		.67	.62	.63	.60
450/114	.66	.64		.65	.60	.61	
600/156	.64	.62		.63	.59	.60	.60
900/230	.62	.60		.61			.58
900 & Heavier							.58

Current Prices

Chromspun—Standard Colors (Except Black)

Denier & Filament	Regular Twist Cones	Beams	Intermediate Twist Cones	Beams	Low Twist Cones	Beams
55/13	$1.39	$1.40	$1.37	$1.38	$1.31	$1.32
75/19	1.36	1.37	1.34	1.35	1.28	1.29
100/25	1.30	1.31	1.28	1.29	1.22	1.23
150/38			1.11	1.12	1.06	1.07
300/75			1.01	1.02	.97	.98
450/114			.99	1.00	.95	.96
900/230			.94	.95		

Current Prices

Chromspun—Black

Denier & Filament	Regular Twist Cones	Intermediate Twist Cones	Beams	Low Twist & Spun Twist Beams
55/13	$1.19	$1.17	$1.18	$1.12
75/19	1.16	1.14	1.15	1.09
100/25	1.10	1.08	1.09	1.03
150/38	.93	.91	.92	.87
200/50	.87	.85	.86	.82
300/75	.83	.81	.82	.78
450/114	.81	.79	.80	.76
900/230	.76	.74	.75	

Prices are subject to change without notice.

Prices on special items quoted on request.

Terms: Net 30 days. Payment—U. S. A. dollars.

Transportation charges prepaid or allowed to destination in the United States east of Mississippi River. Seller reserves right to select route and method of shipment. If Buyer requests and Seller agrees to a route or method involving higher than lowest rate Buyer shall pay the excess of transportation cost and tax.

RAYON STAPLE and TOW

American Viscose Corp.

Effective July 26, 1954

Rayon Staple

	Bright and Dull
Regular	$ .34
Extra Strength	
1.0 Denier	.38
"Viscose 32A"	.38
"Avisco Crimped"	
1.25 Denier	.36
3.0 & 5.5 Deniers	.35
8.0 & 15.0 Deniers	.37
"Avisco Smooth"	
8.0, 15.0 & 22.0 Deniers	.39
Short Staple Blend	.36

Rayon Tow

Grouped Continuous Filaments (200,000 Total Denier)	
1.5, 3.0 & 5.5 Denier Per Filament	.36
9.0 Denier Per Filament	.38
Grouped Continuous Filaments (4400/3000 & 2200/1500)	.65

Prices of other descriptions on request.

Terms: Net 30 days.

Celanese Corp. of America

Current Prices

Rayon Tow

	Bright & Dull
1.5, 3, 5 D.P.F.	.34
8 D.P.F.	.36

Courtaulds (Alabama) Inc.

Effective April 23, 1956

Rayon Staple

	Bright	Dull
1½ and 3 denier	$.31	$.31

Available in 1⅛", 1-9/16" and 2".

"Coloray" Spun Dyed Rayon Staple

	1½ Den. 1-9/16"	3 Den. 2"	4½ Den. 6"	Price per Lb.
	(Code numbers for color and denier)			
Black	1404	1419	1425	37¢
Tan	8004	8019	8025	39¢
Medium Brown	8804	8819	8825	39¢
Silver Grey	1004	1019	1025	39¢
Terra Cotta	8204	8219	8225	39¢
Khaki	3004	3019	3025	40¢
Dark Brown	8604	8519	8525	40¢
Slate Grey	0804	0819	0825	43¢
Light Blue	4004	4019	4025	44¢
Sulphur	2004	2019	2025	44¢
Apple Green	5004	5019	5025	45¢
Peacock Blue	4604	4619	4625	46¢
Medium Blue	4204	4219	4225	48¢
Dark Blue	4404	4419	4425	49¢
Hunter Green	5404	5419	5425	49¢
Indian Yellow	2504	2519	2525	49¢
Pink	6004	6019	6025	50¢
Turquoise	4804	4819	4825	50¢
Malachite Green	5204	5219	5225	51¢
Red	7004	7019	7025	56¢

(In addition to the above, Black is also available in:
1½ den. 1⅛" (1401) 3 den. 1-9/16" (1416) 4½ den. 2"
3 den. 1⅛" (1413) 3 den. 2½" (1420) 4½ den. 4")

Terms: Net 30 days, f.o.b. LeMoyne, Alabama. Minimum transportation allowed to points in U.S.A. east of Mississippi River.

The Hartford Rayon Co.

Div. Bigelow-Sanford Carpet Co., Inc.

Rayon Staple

Effective February 8, 1956

REGULAR

1.5 denier Bright 1½" and 2" ..... 32¢

VISCALON 44

15 denier 3" Dull ..... 39¢

VISCALON 66 (Crimped)

8 denier 2" Bright ..... 35¢
15 denier 3" Bright ..... 35¢
15 denier 3" Dull ..... 35¢

"KOLORLOK"—Solution Dyed Rayon Staple—15 denier 3"

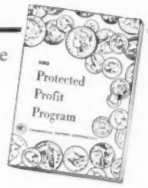
	Bright	Dull
Grey	45¢	45¢
Sandalwood	45¢	45¢
Nutria	45¢	45¢
Light Green	45¢	45¢
Mint Green	45¢	45¢
Champagne	45¢	45¢
Brown	55¢	...
Black	45¢	...

Terms: Net 30 days. Prices are quoted f.o.b. shipping point, lowest cost of transportation allowed, or prepaid. To points West of the Mississippi, lowest cost of transportation allowed to the Mississippi River crossing.

To get sound counselling on your sales problems

Commercial Factors *Corporation*

TWO PARK AVENUE NEW YORK 16, N. Y.
MURRAY HILL 3-1200



Send today for free brochure. This brochure describes all the key features of the "Protected Profit Program"... and offers valuable suggestions on how to expand your business and safeguard your profits. For your copy, phone or write to Mr. G. D. Moran, V.P., Dept. M-5

Pinpointing YOUR ring problems

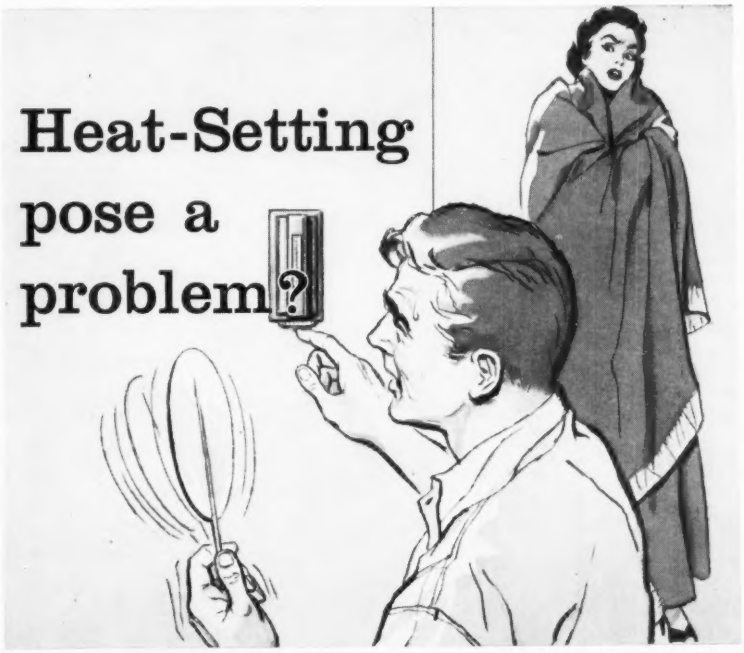
is the first step toward solving them ———— may we help?

Your ring problems are our business. Making the world's largest line of standard and lubricated rings . . . working closely with the traveler manufacturers . . . we can often suggest practical short cuts to the results you want.

WHITINSVILLE (MASS.) SPINNING RING CO.
DIAMOND FINISH
Makers of Spinning and Twister Rings since 1873

Rep. for the Carolinas: W. K. SHIRLEY, 25 Oak St., Belmont, N. C.
Rep. for Ala., Ga., & Tenn.: H. M. JACKSON, 216 Longview Dr., Jefferson, Ga.

Heat-Setting pose a problem?



Try this for size — Supranyl, Stein Hall's miracle size for nylon warps. It's unaffected by heat — and still it can be readily removed in your scouring bath. But that's not all! Supranyl, because of its unsurpassed affinity and adhesion to nylon yarns, offers you maximum protection against abrasion in weaving.

Find out now how Supranyl can save you many dollars in your operation. It requires no additives . . . stands greater dilution . . . and your initial cost is lower. Write today for more information, Textile Department

SUPRANYL Withstands Heat-Setting
. . . yet is Easy to Remove!

STEIN HALL
285 MADISON AVENUE NEW YORK 17, N. Y.
Established 1866

ACETATE STAPLE and TOW

Celanese Corp. of America

Current Prices

Staple

	Bright & Dull
Celanese Acetate Staple	
2, 3, 5.5 & 8 Individual Deniers	$.32
12 & 17 Individual Deniers	.33
35 & 50 Individual Deniers	.36
Variable Acetate Fibers	.30
35 Individual Denier Flat Filament Acetate	.38

Tow

	Bright & Dull
Celanese Celatow Acetate	
2, 3, 5.5 & 8 Individual Deniers	$.34
12 & 17 Individual Deniers	.35
35 & 50 Individual Deniers	.37

Terms: Net 30 days. Prices per pound F.O.B. shipping point, lowest transportation allowed to destination in U.S.A. east of the Mississippi River.

Prices subject to change without notice.

All previous prices withdrawn.

Eastman Chemical Products, Inc.

Tennessee Eastman Co.

Effective October 31, 1955

Estron Staple

Deniers per Filament	Bright and Dull
2, 3, and 5	$.32 per lb.

Prices are subject to change without notice.

Prices on special items quoted on request.

Terms: Net 30 days. Payment—U. S. A. dollars.

Transportation charges prepaid or allowed to destination in the United States east of Mississippi River. Seller reserves right to select route and method of shipment. If Buyer requests and Seller agrees to a route or method involving higher than lowest rate Buyer shall pay the excess of transportation cost and tax.

NON CELLULOSIC YARN

ACRYLIC

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

"Orlon"

	1st Grade	2nd Grade
75 denier, 30 filaments	$2.65	$2.35
100 denier, 40 filaments	2.35	2.10
200 denier, 80 filaments	2.25	2.00

Terms: Net 30 days.

These prices are subject to change without notice.

Freight Terms—F.O.B. Shipping Point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation allowed or prepaid to Mississippi River Crossing.

NYLON

Allied Chemical and Dye Corporation

"Caprolan" Tensile Tough Nylon

Effective March 19, 1956

Heavy Yarns

Denier	Filament	Turn/in.	Type**	Package	Price/Lb.
2100	6 d/f	Nominal	HB	Parallel Paper Tube*	$1.27
2500	6 d/f	Nominal	HB	Parallel Paper Tube	1.27
3360	6 d/f	Nominal	HB	Parallel Paper Tube	1.26
5000	6 d/f	Nominal	HB	Parallel Paper Tube	1.25
7500	6 d/f	Nominal	HB	Parallel Paper Tube	1.24
10,000	6 d/f	Nominal	HB	Parallel Paper Tube	1.24
15,000	6 d/f	Nominal	HB	Parallel Paper Tube	1.23

Terms—Net 30 days.

These prices are subject to change without notice. All prices are quoted f.o.b. shipping point.

Lowest freight cost prepaid or allowed east of Mississippi River.

* Parallel Paper Tubes non-returnable, no charge.

** Type is used to describe luster and tenacity.
Type HB: High Tenacity, Bright.

American Enka Corporation

Nylenka Filament Yarn Prices

Effective March 16, 1956

Denier & Filament	Twist	Luster	Type	Tenacity	Package	Yarn Weight per Package	Price per Pound, Std.	Price per Pound, Sub.
15/7	0.5Z	semi-dull	9408	Normal	Pirn	1 lb.	$5.00	$4.80
30/8	0.5Z	semi-dull	9424	Normal	Pirn	2 lb.	2.25	2.10
40/8	0.5Z	semi-dull	9426	Normal	Pirn	2 lb.	1.90	1.75
50/13	0.5Z	semi-dull	9442	Normal	Pirn	2 lb.	1.80	1.70
100/32	0.5Z	semi-dull	9652	Normal	Pirn	2 lb.	1.60	1.55
200/34	0.5Z	bright	9822	Normal	Pirn	2 lb.	1.45	1.40
200/34	0.5Z	bright	9222	Normal	Cone	4 lb.	1.45	1.40
210/34	0.5Z	bright	9204	High	Pirn	2 lb.	1.45	1.40
210/34	0.5Z	bright	9214	High	Cone	4 lb.	1.45	1.40
840/140	0.5Z	bright	9202	High	Pirn	2 lb.	1.30	1.20
840/140	0.5Z	bright	9208 9228	High	Cone	4 lb.	1.30	1.20
840/140	0.5Z	bright	9302	High	Beam	—	1.30	1.20

Pirns charged at $.25 each. Deposit refunded upon return of pirn in good condition. Cones are non-returnable. Beams and cradles are deposit carriers and remain property of American Enka Corporation.

Terms: Net 30 days. Minimum common carrier transportation charges will be prepaid and absorbed to the first destination on or east of the Mississippi River. In prepaying transportation charges, seller reserves the right to select the carrier used.

The Chemstrand Corp.

Current Prices

Denier	Filament	Twist	Type*	Package	Standard Price/lb.	Second Price/lb.
10	1	O	SD	Bobbins	$8.00	$7.60
15	1	O	SD	Bobbins	5.00	4.80
15	3	Z	SD	Bobbins	5.00	4.80
20	7	Z	SD	Bobbins	2.75	2.55
30	10	Z	SD	Bobbins	2.25	2.10
40	7	Z	SD	Bobbins	2.00	1.75
40	13	Z	SD	Bobbins	1.90	1.75
40	13	Z	D	Bobbins	1.95	1.75
50	17	Z	SD	Bobbins	1.80	1.70
70	34	Z	SD	Bobbins	1.60	1.55
70	34	Z	B	Bobbins	1.60	1.55
70	34	Z	HB	Bobbins	1.65	1.55
100	34	Z	SD	Bobbins	1.60	1.55
100	34	Z	HB	Bobbins	1.65	1.55
140	68	Z	SD	Bobbins	1.55	1.50
200	34	Z	B	Bobbins	1.45	1.40
210	34	Z	HB	Bobbins	1.45	1.40
260	17	Z	HB	Bobbins	1.45	1.35
840	140	Z	HB	Beams	1.30	1.20
840	140	Z	HB	Tubes	1.30	1.20

Terms: Net 30 days.

Lowest transportation paid to destination east of Mississippi River.
Note: All Standard Quality Yarn—No break.

Bobbins, tubes, beams, and crates for beams become the property of the yarn purchaser. Bobbins are invoiced at 25¢ or 45¢ each, depending on type; tubes are invoiced at 40¢ each; and beams and crates for beams are invoiced at $220 and $25 respectively.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

Nylon Yarn

Denier	Filament	Turn/In.	Twist	Type*	Package	1st Grade	2nd Grade
7	1	0	O	200	Bobbin	$9.00	$8.55
10	1	0	O	200	Bobbin	8.00	7.60
12	1	0	O	200	Bobbin	7.00	6.65
12	4	¼	Z	200	Bobbin	7.00	6.65
15	1	0	O	200	Bobbin	5.00	4.80
15	1	0	O	670/680	Bobbin	5.05	4.80
15	3	¼	Z	200	Bobbin	5.00	4.80
20	1	0	O	200	Bobbin	4.00	3.80
20	7	½	Z	200	Bobbin	2.75	2.55
20	7	½	Z	670	Bobbin	2.80	2.55
20	20	¾	Z	209	Bobbin	6.00	
30	10	½	Z	100/200	Bobbin	2.25	2.10
30	10	½	Z	670/680	Bobbin	2.30	2.10
30	26	½	Z	200	Bobbin	2.35	2.15
40	1	0	O	100/200	Bobbin	3.50	3.30
40	7	½	Z	200	Bobbin	2.00	1.75
40	13	½	Z	100/200	Bobbin	1.90	1.75
40	13	½	Z	400	Bobbin	2.00	1.85
40	13	½	Z	670/680	Bobbin	1.95	1.75
40	34	½	Z	200	Bobbin	2.00	1.80
50	7	½	Z	200	Bobbin	1.90	1.70
50	17	½	Z	200	Bobbin	1.80	1.70
50	17	½	Z	670	Bobbin	1.85	1.70
60	20	½	Z	200	Bobbin	1.70	1.60
70	17	½	Z	100/200	Bobbin	1.60	1.55
70	34	½	Z	100/200	Bobbin	1.60	1.55
70	34	½	Z	300	Bobbin	1.65	1.55
70	34	½	Z	670/680	Bobbin	1.65	1.55
80	26	½	Z	200	Bobbin	1.60	1.55
80	68	½	Z	200	Bobbin	1.65	1.55
100	34	½	Z	100/200	Bobbin	1.60	1.55
100	34	½	Z	300	Bobbin	1.65	1.55
100	34	½	Z	680	Bobbin	1.65	1.55
140	68	½	Z	100/200	Bobbin	1.55	1.50
140	68	½	Z	300	Bobbin	1.60	1.50
200	34	¾	Z	100	Bobbin	1.45	1.40
200	34	¾	Z	680	Bobbin	1.50	1.40
200	68	¾	Z	200	Bobbin	1.45	1.35
210	34	¾	Z	300	Bobbin/Beam	1.45	1.40
260	17	1	Z	100	Bobbin	1.45	
260	17	1	Z	300	Bobbin	1.45	1.35
400	68	¾	Z	100	Bobbin	1.35	1.25
420	68	¾	Z	300	Bobbin	1.35	1.25
800	140	½	Z	100	Bobbin	1.35	1.25
840	136	¾	Z	300	Bobbin	1.30	1.20
840	140	½	Z	300	Alum. Tube/Beam	1.30	1.20
Industrial Yarn						**Price/Lb.**	
2100	340	0	O	300	Paper Tube	1.27	
2520	420	0	O	300	Paper Tube	1.27	
5040	2520	0	O	300	Paper Tube	1.25	
15120	2520	0	O	300	Paper Tube	$1.23	

These prices are subject to change without notice.

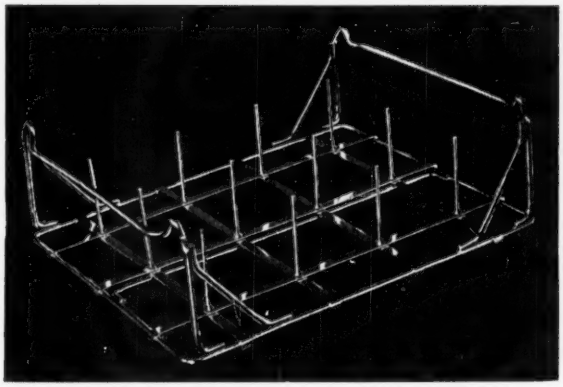
Terms—Net 30 Days.

Freight Terms—F.O.B. Shipping Point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation allowed or prepaid to Mississippi River Crossing.

Following are invoiced as a separate item:
Bobbins at 25 cents or 45 cents each depending on type.
Aluminum Tubes at 40 cents each.
Beams (Domestic Price) at $220.00 each.
Cradles (Domestic Price) for Beams at $115.00 each.
(Beams and Cradles are deposit carriers and remain the property of E. I. du Pont de Nemours & Co.)

Types

* Type is used to describe luster, tenacity, and size or oil content.
Type 100 Bright, normal tenacity.
Type 200 Semidull, normal tenacity.
Type 209 Semidull, normal tenacity, #S-139 spin finish.
Type 300 Bright, high tenacity.
Type 670 Dull, normal tenacity.
Type 680 Dull, normal tenacity.



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Gessner builds Hi-Torc Nappers as single machines or in tandem. In tandem, these nappers will nap the same side of the cloth, or both sides at the same time. And in tandem, for the first time, the operator knows exactly the napping effect of the second machine simply by watching the panel. The napping performance is indicated accurately and constantly on the panel dials.

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The Hi-Torc Napper has the necessary horsepower to drive both the pile and counterpile rolls on the breaking runs. That's why Hi-Torc cuts down the number of runs — saves you napping time and considerable money.

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WORCESTER, MASS.

Canadian Representative: W. J. Westaway, Montreal, Quebec, Hamilton, Ont.

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POLYESTER

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

"Dacron"

Den.	Fil.	Twist	Luster	Type	Tubes 1st Gr.
30	20	0	Dull	5700	$2.75
40	27	0	Semi-Dull	5600	2.30
40	27	0	Dull	5700	2.35
70	14	0	Bright	5500	1.90
70	34	0	Semi-Dull	5600	1.90
70	34	0	Bright	5500	1.90
70	34	0	Dull	5700	1.95
150	68	0	Semi-Dull	5600	1.80
220	50	0	Bright	5100	1.75
250	50	0	Bright	5500	1.75
1100	250	0	Semi-Dull	5900	1.50
1100	250	0	Bright	5100	1.50

Terms: Net 30 days. Prices subject to changes without notice. Freight Terms—F.O.B. Shipping Point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi lowest cost of transportation allowed or prepaid to Mississippi River Crossing.

Yarn Types

5100 Bright High Tenacity
5600 Semi-Dull Normal Tenacity
5700 Dull Normal Tenacity
5500 Bright Normal Tenacity
5900 Semi-Dull High Tenacity

Tubes are invoiced as a separate item at $.50, $.70, or $.80 each and are returnable for credit.

* Trademark for du Pont's polyester fiber.

NON CELLULOSIC STAPLE & TOW

ACRYLIC

The Chemstrand Corp.

Current Prices

"Acrilan"

2.0 denier Semi-dull staple and tow	$1.18
3.0 denier Bright & Semi-dull staple and tow	1.12
5.0 denier Bright & Semi-dull staple and tow	1.12
Hi-Bulk staple Semi-dull	1.12

Terms: Net 30 days. Freight prepaid to points east of the Mississippi River.

Carbide and Carbon Chemicals Co.

Div. Union Carbide and Carbon Corp.

Textile Fibers Dept.

Effective November 1, 1955

Dynel Staple

Natural Dynel	
3, 6, 12, and 24 Denier, Staple and Tow	$1.05 per lb.
Whitened Dynel, and Dynel Spun with Light Colors: Blonde, Gray, or Taupe	
3 and 6 Denier, Staple and Tow	1.20 per lb.
Dynel Spun with Dark Colors: Black and Brown	
3 and 6 Denier, Staple and Tow	1.30 per lb.

Prices are quoted f.o.b. South Charleston, W. Va.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

"Orlon" Acrylic Staple & Tow

Denier	Price 1st Grade
2.0 Denier	$1.30
3.0 Denier	1.25
3.0 Denier Color-sealed Black—Staple only	1.60
4.5 Denier	1.20
6.0 Denier	1.20

Staple Lengths—1½", 2", 2½", 3", 4½".

High Shrinkage Staple same price as Regular Staple.

F.O.B. Shipping Point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation prepaid or allowed to Mississippi River crossing.

Prices subject to change without notice.

NYLON

American Enka Corp.

Nylenka (Nylon Six Staple)

Denier	Luster	Length (Inches)	Price per pound
3	semi-dull	1⅛, 1½, 2, 2⅝, 3, 4½	$1.25
6	bright	3, 4½	1.25
8	bright	2⅝	1.20
10	bright	3	1.20
15	bright	3	1.20

Deniers and lengths of staple not listed above are available upon special request.

Terms: Net 30 days. Minimum common carrier transportation charges will be prepaid and absorbed to the first destination on or east of the Mississippi River. In prepaying transportation charges, seller reserves the right to select the carrier used.

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

Nylon Staple and Tow

Denier	Length	Type*	Price/Lb.
1.5	1⅛"—1½"—2"—2½"	100/200	$1.30
1.5	1⅛"—1½"—2"—2½"	101/201	1.32
3.0	1⅛"—1½"—2"—2½"—3"—4½"	100/200	1.25
3.0	1⅛"—1½"—2"—2½"—3"—4½"	101/201	1.27
6.0	1⅛"—1½"—2"—2½"—3"—4½"	100/200	1.25
6.0	1⅛"—1½"—2"—2½"—3"—4½"	101/201	1.27
15.0	1½"—3"—4½"—6½"	100	1.20
15.0	1½"—3"—4½"—6½"	101	1.22

Tow price same as Staple for:

1.5 denier type 200 in 330,000 total denier
1.5 denier type 201 in 350,000 total denier
3.0 denier type 100/200 in 430,000 total denier
3.0 denier type 101/201 in 455,000 total denier
6.0 denier type 100 in 330,000 total denier
6.0 denier type 101 in 345,000 total denier
15.0 denier type 100 in 330,000 total denier
15.0 denier type 101 in 350,000 total denier

These prices are subject to change without notice.

Terms: Net 30 days. Freight Terms—F.O.B. Shipping Point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation allowed or prepaid to Mississippi River Crossing.

Types

* Type is used to describe luster, tenacity, not crimpset, or crimpset.

Type 100 Bright, normal tenacity, not crimpset.
Type 101 Bright, normal tenacity, crimpset.
Type 200 Semi-dull, normal tenacity, not crimpset.
Type 201 Semi-dull, normal tenacity, crimpset.

Industrial Rayon Corp.

Effective November 23, 1955

Nylon Staple

1.5 denier	$1.30 per lb.
2, 3 and 6 denier	1.25 per lb.
8 and 15 denier	1.20 per lb.

Bright and semi-dull, required length.

Terms: Net 30 days f.o.b. point of shipment; title to pass to buyer on delivery of goods to carrier. Domestic transportation charges allowed at lowest published rate to all points east of the Mississippi River.

POLYESTER

E. I. du Pont de Nemours & Co.

Textile Fibers Dept.

Current Prices

"Dacron" Staple and Tow

Den.	Luster	Type	Staple Length	Tow Bundle	1st Gr.
1.5	Semi-Dull	5400	1½"-4½"	385M	$1.40
3.0	Semi-Dull	5400	1½"-4½"	385M	1.35
4.5	Semi-Dull	5400	1½"-4½"	385M	1.35
6.0	Semi-Dull	5400	1½"-4½"	385M	1.35

Terms: Net 30 days. Freight Terms—F.O.B. Shipping point—Lowest cost of transportation allowed or prepaid. To points west of Mississippi, lowest cost of transportation allowed or prepaid to Mississippi River Crossing.

Prices subject to change without notice.

POLYVINYL ACETATE

American Viscose Corp.

Effective October 1, 1950

Vinyon Staple

3.0 denier ½" unopened	$.80 per lb.
3.0 denier 1¼", 2" opened	.90 per lb.
5.5 denier 1", 3½" opened	.90 per lb.

Terms: Net 30 days.

Tire Cord Prices Reduced

Three producers of rayon tire cord last month cut prices. Industrial Rayon Corp. made reductions of six cents per pound effective March 26. The new prices are 58 cents per pound for the company's Tyron 100 rayon tire yarn and 63 cents per pound for its new higher strength Tyron 200 tire yarn.

American Viscose Corp., effective April 2, announced these new prices for tire yarn: Super Rayflex 1650 denier, type 110, 66 cents; 1650 denier, type 200-300, 64 cents. Other reductions were: tire yarn: 1100 denier, 62 cents; 1650 denier, 58 cents; 2200 denier, 58 cents.

Also effective April 2, the Du Pont Co. was reported in the trade to have made the following cuts in tire yarn prices: 1650 denier, types 258 and 168 Super Cordura high tenacity rayon tire yarn to 61 cents a pound from 69 cents; 1650 denier Type 272 to 64 from 73 cents.

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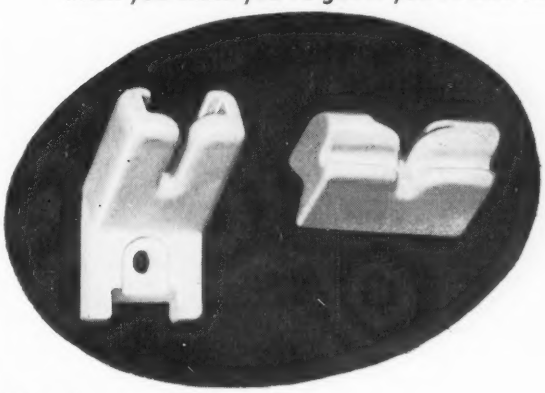
Modesty is a strange thing — when you think you've got it you've lost it.



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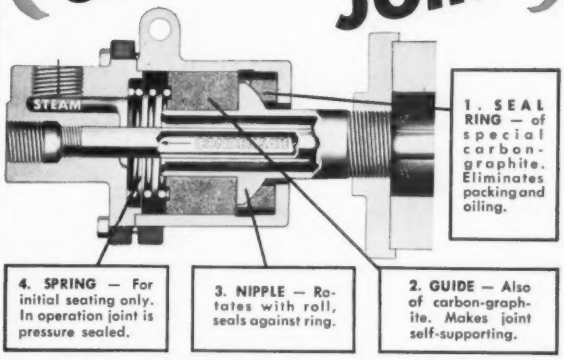
Only 4 internal parts in this self-supporting
Johnson Joint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1. SEAL RING — of special carbon-graphite. Eliminates packing and oiling.
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3. NIPPLE — Rotates with roll, seals against ring.
4. SPRING — For initial seating only. In operation joint is pressure sealed.

With this 3000 Series Type S-B2 Joint, an assembly plate can be added at any time; it is used with the Johnson Syphon Elbow, to hold internal parts in position when the head is removed. Write for Bulletin No. S-2001.

The Johnson Corporation
844 Wood St., Three Rivers, Mich.

PROTEIN

Charlotte Fibre Co.

Exclusive Agents for Snia Viscosa Italy "Merinova"

Effective January 1, 1954

Merinova Staple

3 Denier 1-9/16", 2-½" and 3"	$.81
5 Denier 1-1/16", 1-9/16", 2-½", 4" and 6"	.81
9 Denier 4"	.81
18 Denier 6", 2-½"	.81
60 Denier 14"	.85

Other lengths or deniers can be produced as requested.
Solution-dyed Merinova staple fiber.

Light colors	.90 per lb.
Medium colors	.95 per lb.
Dark colors	1.00 per lb.
French Combed Tops	1.10

Terms: Net 30 days. All prices are duty paid, landed free, freight prepaid to rail point nearest destination.

Virginia-Carolina Chemical Corp.

Fiber Division

Effective January 15, 1951

Vicara Staple

	Standard Crimp	Highly Crimped
3 Denier	$1.00 per lb.	$1.05 per lb.
5 Denier	1.00 per lb.	1.05 per lb.
7 Denier	1.00 per lb.	1.05 per lb.

Bleached Vicara Staple

	Standard Crimp	Highly Crimped
3 Denier	$1.10 per lb.	$1.15 per lb.
5 Denier	1.10 per lb.	1.15 per lb.
7 Denier	1.10 per lb.	1.15 per lb.

Staple length ½ to 6 in.
Supplied in staple lengths or as continuous tow (270,000 filaments).
Terms: Net 30 days.
Prices f.o.b. Taftville, Conn. on 10% moisture regain basis.

J. E. SIRRINE CO.
GREENVILLE • SOUTH CAROLINA
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Business Service Section

VISCOSE RAYON

CHIEF ENGINEER—Graduate Mechanical Engineer with at least 10 years experience in rayon industry, preferably in staple to take over all charge of Engineering Department of smaller rayon plant. Scope of position covers maintenance, power, design and construction. Administrative ability required.

also . . .

DESIGN AND PROJECT ENGINEER—Graduate Mechanical Engineer, 3-5 years experience in rayon or chemical industry, to be in charge of Design and Drafting Office in the Engineering Department of smaller rayon plant. Scope of work covers machinery—piping—and building—design, equipment layouts, engineering calculations and estimates.

Please send full resume and salary requirements to:

HARTFORD RAYON COMPANY
Division of Bigelow-Sanford Carpet Co.
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Progressive European firm specializing, exclusively, in buying and processing viscose, acetate and synthetic yarns, requires agents U.S.A./Canada, well known in textile circles, capable of handling:

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3.—locating and purchasing cheap lots of yarn from merchants, etc.

Will offer good commissions with possibility of exclusive representation after trial.

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100 and 150 DENIER

OSCAR CHANDLER & CO., INC.
220 FIFTH AVENUE
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HELP WANTED

CELLULOSE ACETATE RESEARCH—Major producer of chemical cellulose has an opening in its Product Research Department for chemist or chemical engineer experienced in the manufacture of cellulose acetate and spinning of acetate yarn.

Box 766, Modern Textiles Magazine
303 Fifth Ave., New York 16, N. Y.

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Calendar of Coming Events

MAY 2—Monthly meeting, AATT, Vanderbilt Hotel, New York, N. Y.
MAY 2-3—The Fiber Society, Clemson House, Clemson, S. C.
MAY 4—The Drysalters Club of New England, Hotel Vendome, Boston, Mass.
MAY 4—Underwear Institute annual convention, New York, N. Y.
MAY 14-19—National Cotton Week, sponsored by National Cotton Council
MAY 18-20—Southeastern International Industrial Exhibition, Atlanta, Ga.
MAY 18—AATCC New York Section, Rochelle Park, N. J.
MAY 30-JUNE 2—Tufted Textile Mfrs. annual convention, Hotel Fontainbleau, Miami, Fla.
MAY 31-JUNE 2—South Carolina Textile Mfrs. Assoc. convention, The Cloisters, Sea Island, Ga.
JUNE 5-7—Textile Technical Federation of Canada textile seminar, Kingston, Ont.
JUNE 5-8—Materials Handling Inst. Exposition, Cleveland, O.
JUNE 6—AATT meeting, Vanderbilt Hotel, New York City.
JUNE 11-15—National Plastics Exposition, Coliseum, New York City.
JUNE 13-15—TDI annual outing and golf tournament, Shawnee-on-Delaware, Pa.
JUNE 14-16—NAHM annual meeting and Hosiery Industry conference, Roanoke, Va.
JUNE 17-22—ASTM annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.
JUNE 20-21—Meeting Div. of High-Polymer Physics of APS, Madison, Wis.
JUNE 21-23—Southern Textile Association annual convention, Blowing Rock, N. C.

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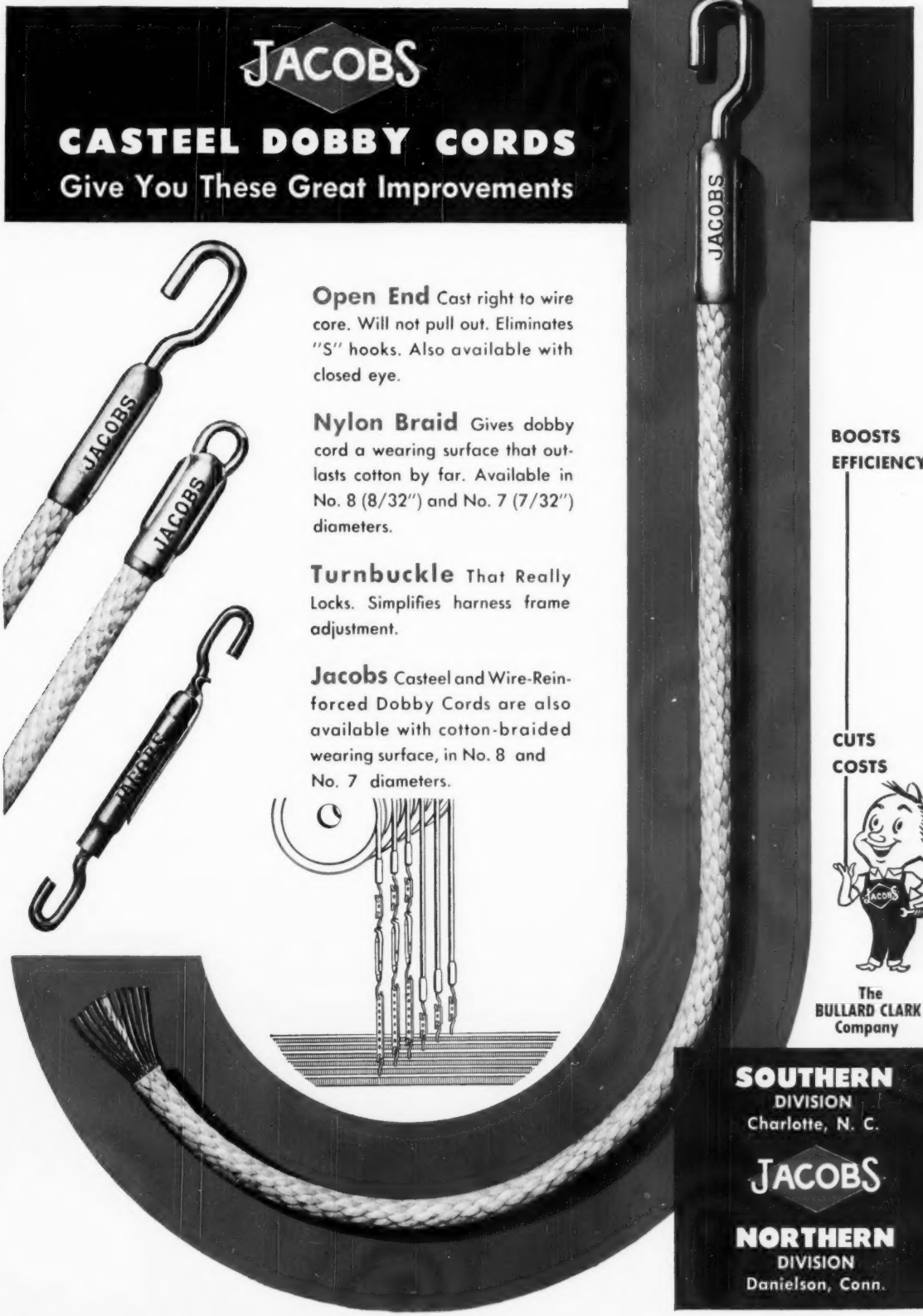

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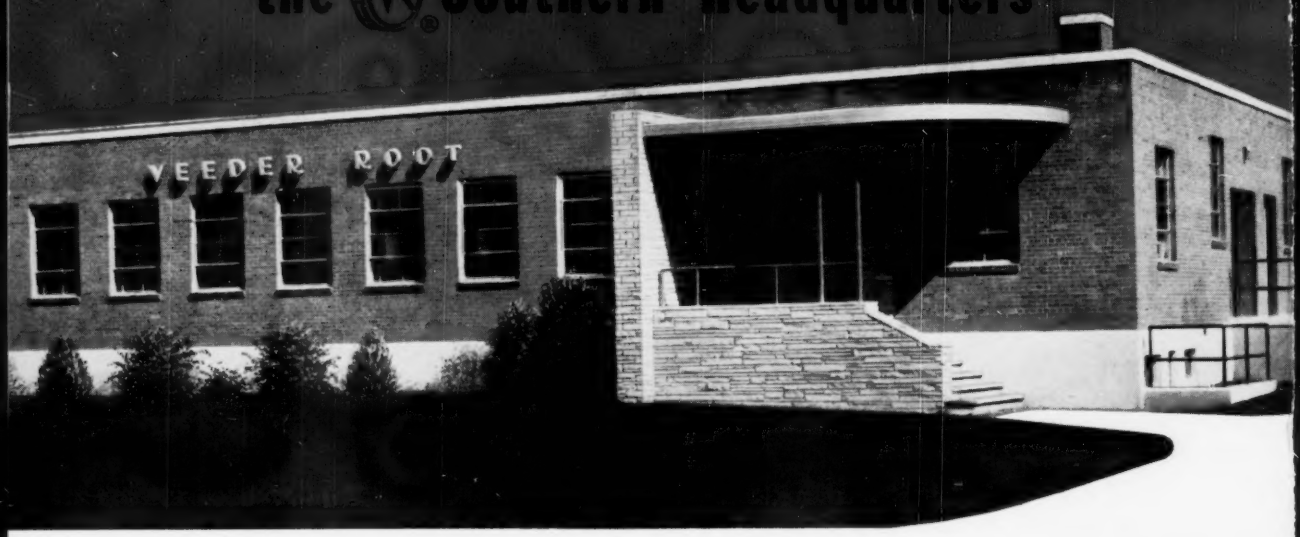

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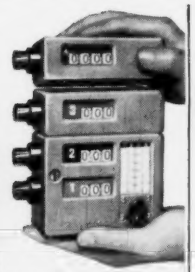

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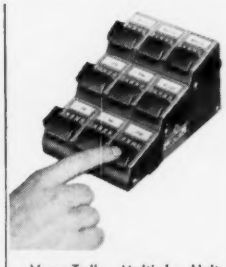

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